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STREAM SURVEY REPORT. BOWIE-LEAF RIVERS, HATTIESBURG, MISSISSIPPI, MARCH 10 TO APRIL 15, 1951

Virgil A. Minch, et al

Environmental Health Center
Cincinnati, Ohio

1951

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PB 229 211

Stream Survey Report

BOWIE-LEAF RIVERS

HATTIESBURG, MISSISSIPPI

March 10 to April 15, 1951

By

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FEDERAL SECURITY AGENCY
Public Health Service
Environmental Health Center
Cincinnati, Ohio

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ABSTRACT

This stream survey was made in conjunction with the program of industrial waste studies being conducted by the United States Public Health Service in Cooperation with State Health Departments and other agencies concerned. The primary purpose of this survey was to determine the sanitary condition of the Bowie and Leaf Rivers in the Hattiesburg, Mississippi area, and to determine the extent of pollution caused by various contributing sources.

For this study 22 stream and waste sampling stations were established, extending over 57 river miles. River sampling was initiated on March 12 and terminated on April 15, 1951. During this period 175 samples were collected and analyzed.

The principal sources of pollution contributing to the Bowie and Leaf Rivers, in the Hattiesburg area, are the effluents from two Naval Stores plants and untreated sewage from the cities of Petal and Hattiesburg, Mississippi. In addition the wastes from a wood processing company at Laurel, Mississippi are discharged into Tallahala Creek which empties into the Leaf River at Mahned, Mississippi.

The minimum dissolved oxygen content observed in Leaf River samples was 6.0 p.p.m. at McLain, Mississippi on April 9. The point of maximum dissolved oxygen depletion was not located during this survey.

Due to high river stages encountered, observations of actual stream conditions were of little value in predicting probable behavior at critical flows.

GENERAL INFORMATION

1. Organization of the Survey

This survey was conducted by the Environmental Health Center of the United States Public Health Service, in cooperation with the Mississippi State Board of Health. Several conferences were held by the technical staffs of the two organizations to discuss results of previous studies, analytical procedures, and the scope of the present survey.

2. Dates of the Survey

March 10, 1951 to April 15, 1951

3. Personnel

The following personnel participated in the preliminary arrangements and conduct of the survey:

Mississippi State Board of Health
H. A. Kroeze, Director, Sanitary Engineering
C. M. Lodbetter, Sanitary Engineer

Mississippi State Game and Fish Commission
William Spence, Chemist, Pollution Control Division

United States Public Health Service, Mobile Laboratory
Virgil A. Minch, Jr. Asst. Sanitary Engineer
Albert L. Platz, Jr, Asst. Sanitary Engineer
William W. Walker, Chemist
Carl N. Shadix, Chemist
Melvin D. Currey, Chauffeur-Mechanic
Stephen D. Pinkoski, Chemist

4. Purpose

This survey was conducted to determine the sanitary condition of the Bowie and Leaf Rivers in the Hattiesburg, Mississippi area, and to determine the extent of pollution caused by various contributing sources. The information obtained will serve as an aid to regulatory agencies in evaluating the present condition of the stream and in controlling the future use of the waters.

5. Location and Description

Bowie and Leaf Rivers are located within the Long-Leaf Pine Hills region in the Pascagoula River basin of southeastern Mississippi.

Bowie River rises in Simpson County and flows Southerly a distance of about 52 miles before joining the Leaf River at Hattiesburg. The river varies in width from 50 to 125 feet and in depth from 2 to 10 feet, at mean low water, and has a drainage area of 475 square miles. The only major tributary is Okatoma Creek at Lux, Mississippi.

Leaf River is formed by the confluence of Oakohay and West Tallahala Creeks at Oakohay, Smith County, Mississippi. The direction of flow is Southerly, passing through Covington, Jones, Forrest, Perry, and Greene Counties before joining the Chickosawhay River at Merrill, Mississippi. The union of the Leaf and Chickosawhay Rivers, at Merrill, form the Pascagoula River which flows a distance of 90 miles and empties into the Mississippi Sound at Pascagoula, Mississippi.

Leaf River is the largest tributary of the Pascagoula and drains an area above Hattiesburg of 1,760 square miles and a total area of 3,600 square miles. The river varies in width from 90 to 450 feet, having an average width at mean low water of 175 feet. The depth varies from 2 to 15 feet at mean low water.

The major tributaries, and the distances above the mouth of the Leaf River are as follows:

Stream	River Mile
Bowie River at Hattiesburg, Mississippi	69.0
Tallahala Creek at Mahned, Mississippi	46.7
Big Bogue Homo at Wingate, Mississippi	37.9
Thompsons Creek at Beaumont, Mississippi	28.4
Gaines Creek above McLain, Mississippi	21.8
Rogers Creek below McLain, Mississipoi	16.5
Oaktibee Creek near Leaf, Mississippi	10.3

Leaf and Bowie Rivers flow through a terrain of rolling to moderately rugged sand and gravel covered hills to which the name Long-Leaf Pine Hills has been given. This region was once covered with a nearly unbroken virgin forest of long-leaf pine, almost all of which has now been cut-over. The rivers are generally torturous, widely meandering, and filled with snags, logs, shoals, and stumps. The river beds are sand and gravel which shifts easily during changing flows. The current is fairly rapid and uniform during periods of normal and high water, but becomes sluggish at low water stages which exist from July to November.

The fall in the Leaf River from Hattiesburg, to the mouth is 94 feet, or an average fall in a normal reach of about 1.2 feet per mile.

6. Sources of Waste

The principal sources of liquid wastes entering Bowie and Leaf Rivers in the Hattiesburg area are as follows:

Bowie River:
1. Hattiesburg Meat Packing Company
2. Hercules Powder Company, stump washer effluent
3. Meridian Fertilizer Company
4. Hercules Powder Company, main plant effluent

Leaf River:
1. Petal, Mississippi outfall sewer
2. Hattiesburg, Mississippi outfall sewer
3. Dixie Pine Products Company (Naval Stores)

In addition to the above sources, wastes from the Masonite Corporation at Laurel, Mississippi are discharged into Tallahala Creek which empties into Leaf River below Mahned, Mississippi.

SURVEY PROCEDURES

7. Sample Collection

The river survey as originally scheduled was to include the Bowie River from the Hercules stump washer effluent to the Leaf River and the Leaf River from the confluence to a point one-half mile downstream. At the request of the Mississippi State Board of Health, the survey was extended to include the Leaf River as far as McBain, Mississippi.

River sampling was initiated on March 12th and continued on the 14th, 15, and 16th. Heavy rains prevented further sampling until March 26th. Extremely heavy precipitation on the 27th, 28th, and 29th, forced further delay in sampling until April 9th. Seven consecutive daily sample runs were made from April 9th to April 15th at which time the river survey was terminated.

The sampler used for the collection of river samples during the survey was a standard brass model, with a valve provided for depth samples. Space was provided for two dissolved oxygen bottles, chemical or bacteriological sample bottle, and a thermometer for determining water temperature.

Samples were taken at a depth of approximately three feet at all points except where shallow water was encountered, in which case the mid-depth was used. In so far as practical the samples were taken at mid-stream, exceptions were at stations 1 and

12 where quarter point samples were taken and composited. A small boat, powered with a 5-horsepower outboard motor, was obtained from the Mississippi State Game and Fish Commission for use in river sampling.

8. Flow Measurements

Stream flow data for the Bowie and Leaf Rivers, since September 1938, are contained in annual Water-Supply Papers of the United States Geological Survey. A compilation and condensation of these records have been published as part of the Mississippi State Geological Survey, Bulletin 68 (Surface Waters of Mississippi). This bulletin was used as a data source for stream flows.

Daily gage readings and discharge figures, for the period of the survey, for Leaf River stations were obtained from the U. S. Geological Survey Office at Jackson, Mississippi.

A gaging station to determine flows in Bowie River was established at Station 3, Southern Railway Bridge, Bowie River mile 2.1. Measurements of discharge were made on March 14th, observed discharge 733 second-feet, and on March 21st, observed discharge 2330 second-feet, using a Price current meter and accessory equipment. From the data obtained charts were constructed from which the discharge corresponding to any river stage can be determined.

Average, maximum and minimum stream flows for U. S. G. S. gaging station on the Bowie and Leaf Rivers are as follows:

TABLE 1

Bowie River near Hattiesburg

Forrest County

Location - Lat. 31° 26', long. 89° 26' in sec. 5T. 5N., R. 14 W. St. Stephens Meridian, at bridge on U. S. Highway 49, 2 miles upstream from Okatoma Creek, and 10 miles northwest of Hattiesburg.

Drainage Area - 304 square miles

Records Available - From September, 1938

Average Discharge, 10 years October, 1938 - September, 1948	494 cfs.
Maximum Discharge March 21, 1943 (5:30 P.M.)	20,100 cfs.
Minimum Discharge September 23-30, October 4-13,16, 1938	100 cfs.
Maximum Discharge, Water Year October, 1946 - September, 1947	707 cfs.
Minimum Discharge, Water Year October, 1940 - September, 1941	332 cfs.
Maximum Discharge, Calendar Year January-December, 1947	735 cfs.
Minimum Discharge, Calendar Year January-December, 1941	349 cfs.
Maximum Discharge, Month March, 1943	2086 cfs.
Minimum Discharge, Month October 1938	104 cfs.
Maximum Discharge, Day March 21, 1943	16,600 cfs.
Minimum Discharge, Day September 23-30, October 4,13,16,1938	100 cfs.

TABLE 2

LEAF RIVER AT HATTIESBURG

FORREST COUNTY

Location - Lat. 31° 21' long. 89° 17' in N W ¼ sec. 2, T. 4 N. R. 13 W. St. Stephens Meridian, at bridge on U. S. Highway 11,300 ft. downstream from Bowie River, 3,000 ft. upstream from New Orleans and Northeastern Railroad bridge and three-quarters of a mile northeast of Hattiesburg.

Drainage Area - 1,760 square miles.

Records Available - From September, 1938

Average Discharge, 10 years October, 1938 - September, 1948	2,739 cfs.
Maximum Discharge March 22, 1943 (3:30 A.M.)	71,300 cfs.
Minimum Discharge, Water Year October 26, 1941	410 cfs.
Maximum Discharge October, 1946 - September, 1947	3, 823 cfs.
Minimum Discharge, Water Year October, 1940 - September, 1941	1, 851 cfs.
Maximum Discharge, Calendar Year January-December, 1947	3, 934 cfs.
Minimum Discharge, Calendar Year January-December, 1941	1, 778 cfs.
Maximum Discharge, Month October, 1938	10,910 cfs.
Minimum Discharge, Month March, 1943	499 cfs.
Minimum Discharge, 7- Day October 22-28, 1941	427 cfs.
Maximum Discharge, Day March 22, 1943	60,200 cfs.
Minimum Discharge, Day October 26, 1941	415 cfs.

TABLE 3

LEAF RIVER NEAR McLAIN, MISSISSIPPI

GREENE COUNTY

Location - Lat. 31° 06', long 88° 48' in SE¼ sec. 29, T. 2 N., R. 8 W. St. Stephens Meridian, at bridge on State Highway 15, 1½ miles east of McLain and 2 miles downstream from Rogers Creek.

Drainage Area - 3,510 Square Miles.

Records Available - From November, 1939

Average Discharge, 8-Years October, 1940 - September, 1948	5,844 cfs.
Maximum Discharge March 24, 1943 (3:00 A.M.)	88,300 cfs.
Minimum Discharge October 26, 1941	640 cfs.
Maximum Discharge, Water Year October, 1946- September, 1947	7,657 cfs.
Minimum Discharge, Water Year October, 1940 - September, 1941	3,607 cfs.
Maximum Discharge, Calendar Year January-December, 1947	8, 377 cfs.
Minimum Discharge, Calendar Year January-December, 1941	3,601 cfs.
Maximum Discharge, Month March, 1948	24,300 cfs.
Minimum Discharge, Month October, 1941	778 cfs.
Minimum Discharge, 7-Day October 24-30, 1941	665 cfs.
Maximum Discharge, Day March 24, 1943	65,500 cfs.
Minimum Discharge, Day October 26, 1941	640 cfs.

Maximum, minimum, and average monthly discharges for Bowie and Leaf Rivers are graphically presented in figures 1, 2, 3, 4, 5, and 6.

Figures 7, 8, 9, and 10 are daily hydrographs of the Bowie and Leaf Rivers for the period of the survey. Table 4 lists the gage heights, discharge, and precipitation for Leaf River index gaging station at Hattiesburg for the same period.

Figure 1

Maximum and Minimum Monthly Average Discharge
Bowie River Near Hattiesburg, Mississippi
October 1938 - September 1948
River Mile - Bowie 14

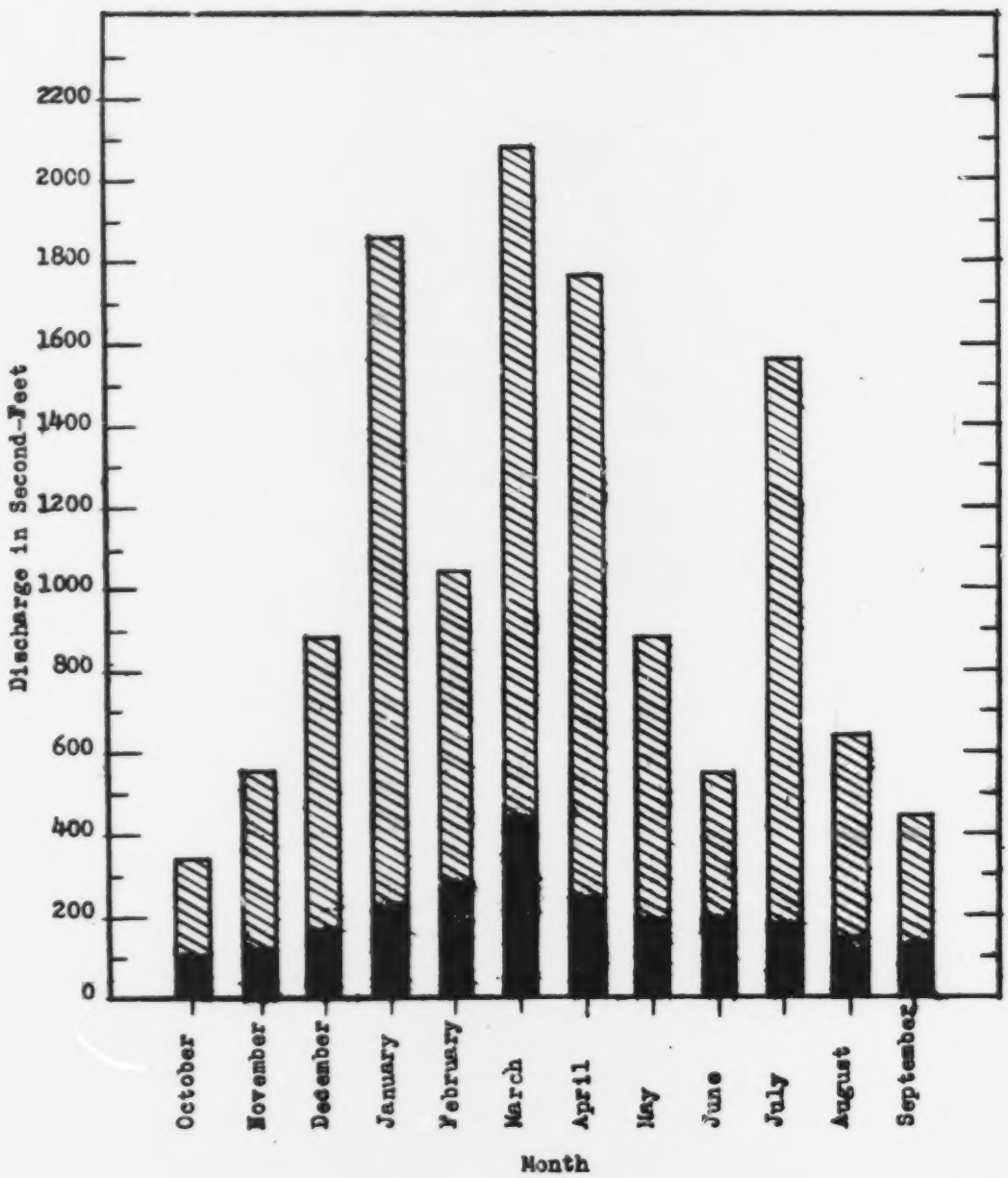


Figure 2

Maximum and Minimum Monthly Average Discharge
Leaf River at Hattiesburg, Mississippi
October 1938 - September 1948
River Mile - Leaf 69

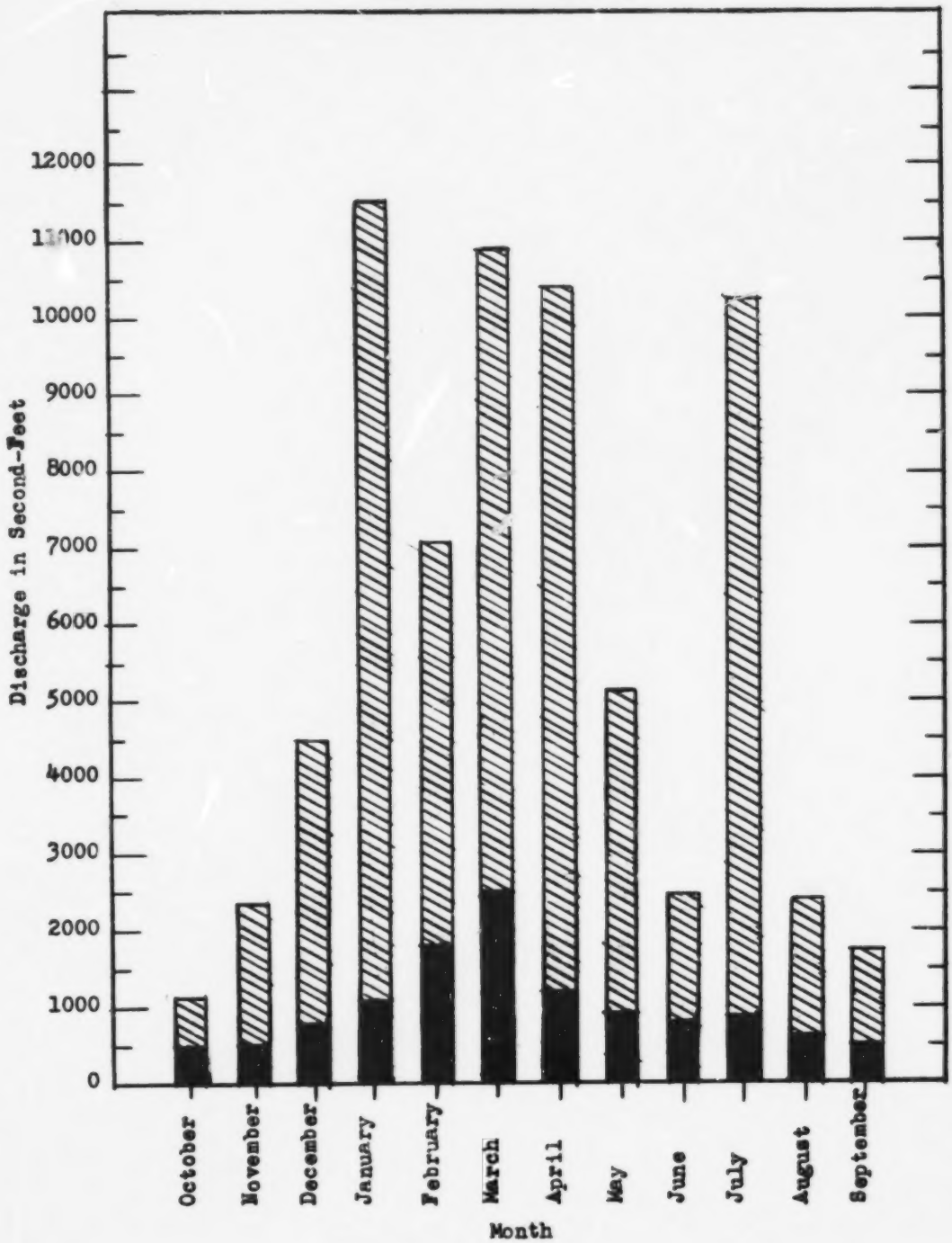


Figure 3

Maximum and Minimum Monthly Average Discharge
Leaf River Near McLain, Mississippi
November 1939 - September 1948
River Mile - Leaf 14.7

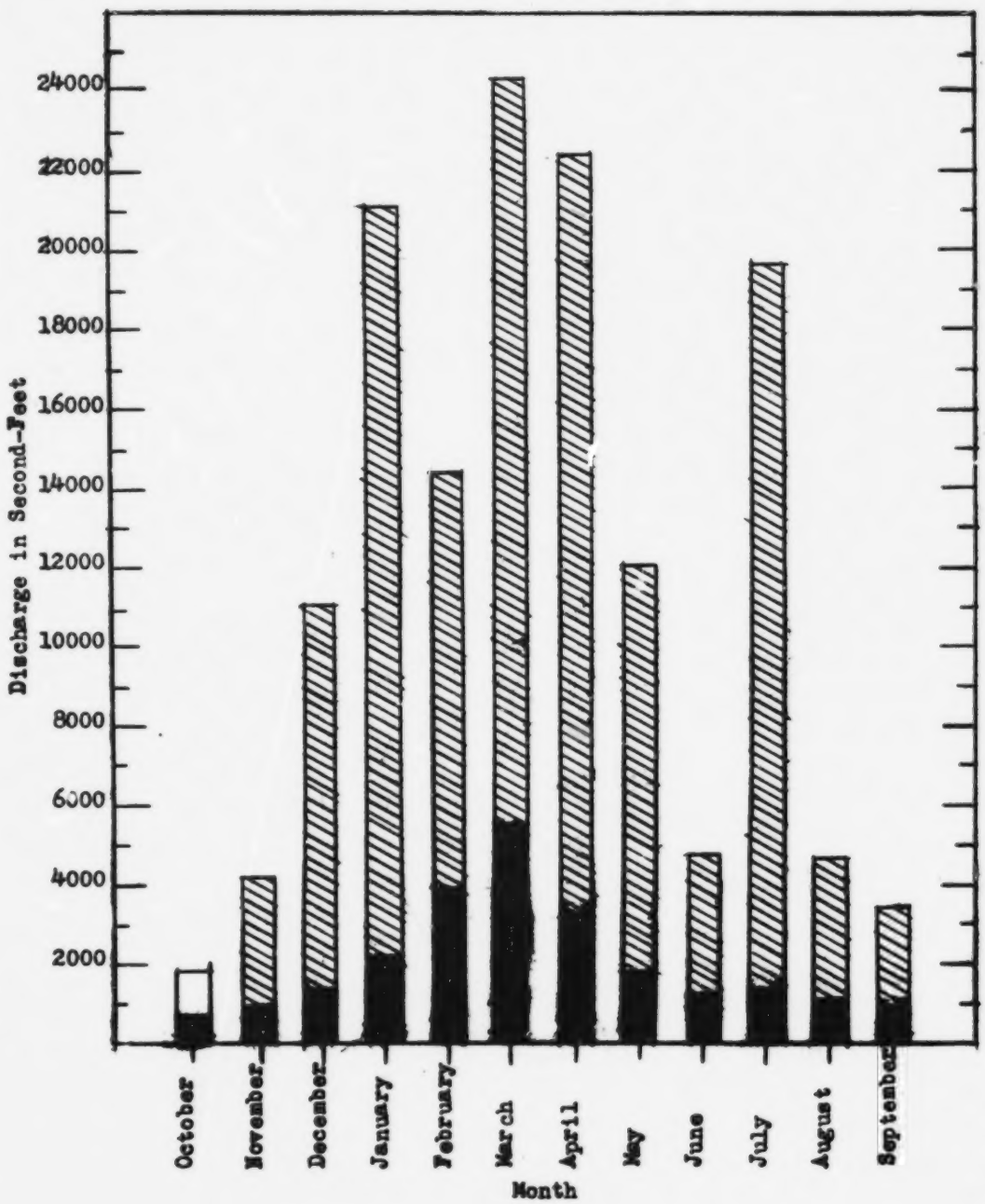


Figure 4

Monthly Average Discharge in Second-Feet
Bowie River Near Hattiesburg, Mississippi
(October 1938 - September 1948)
River Mile - Bowie 14

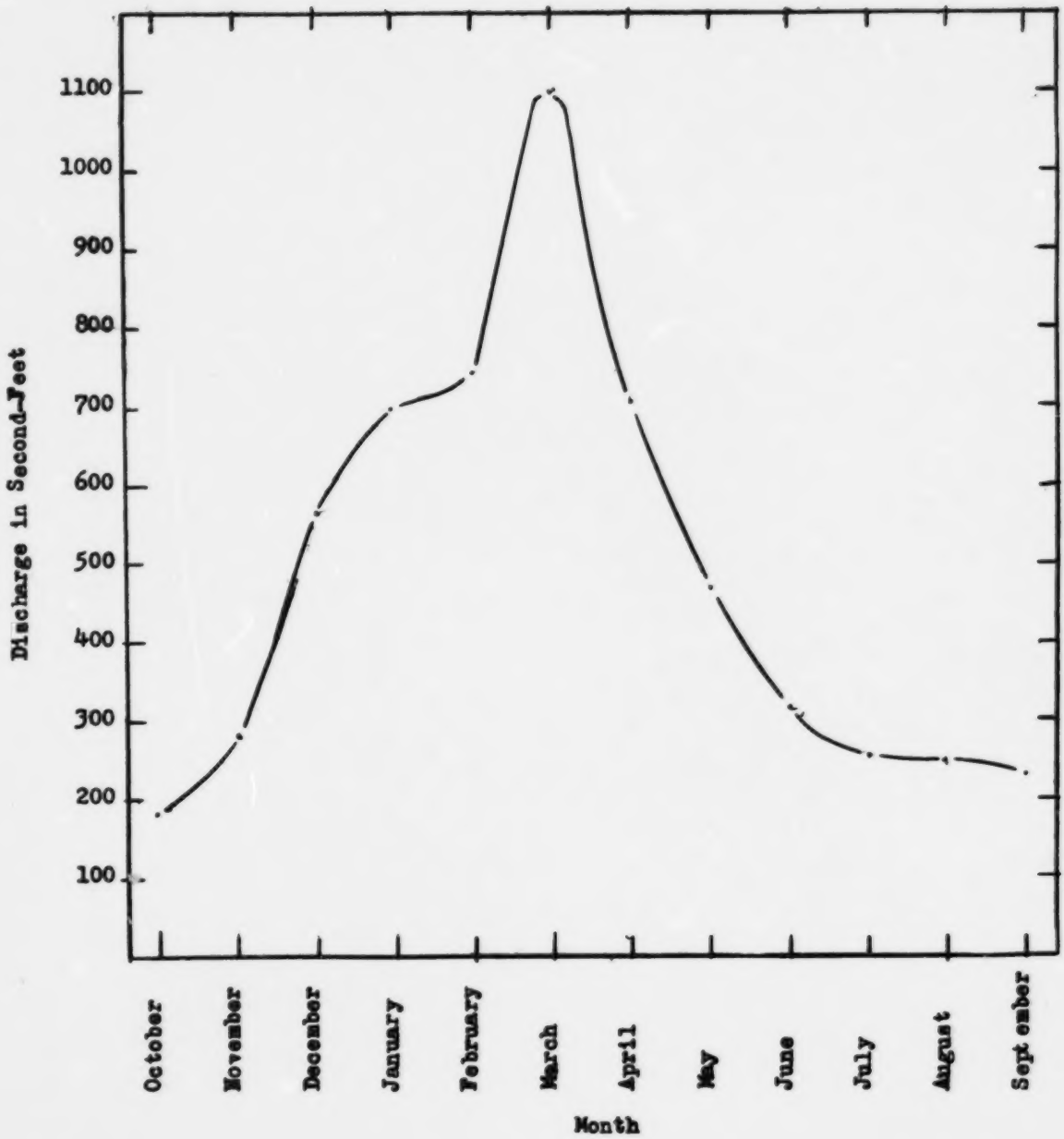


Figure 5

Monthly Average Discharge in Second-Feet
Leaf River at Hattiesburg, Mississippi
(October 1938 - September 1948)
River Mile - Leaf 69

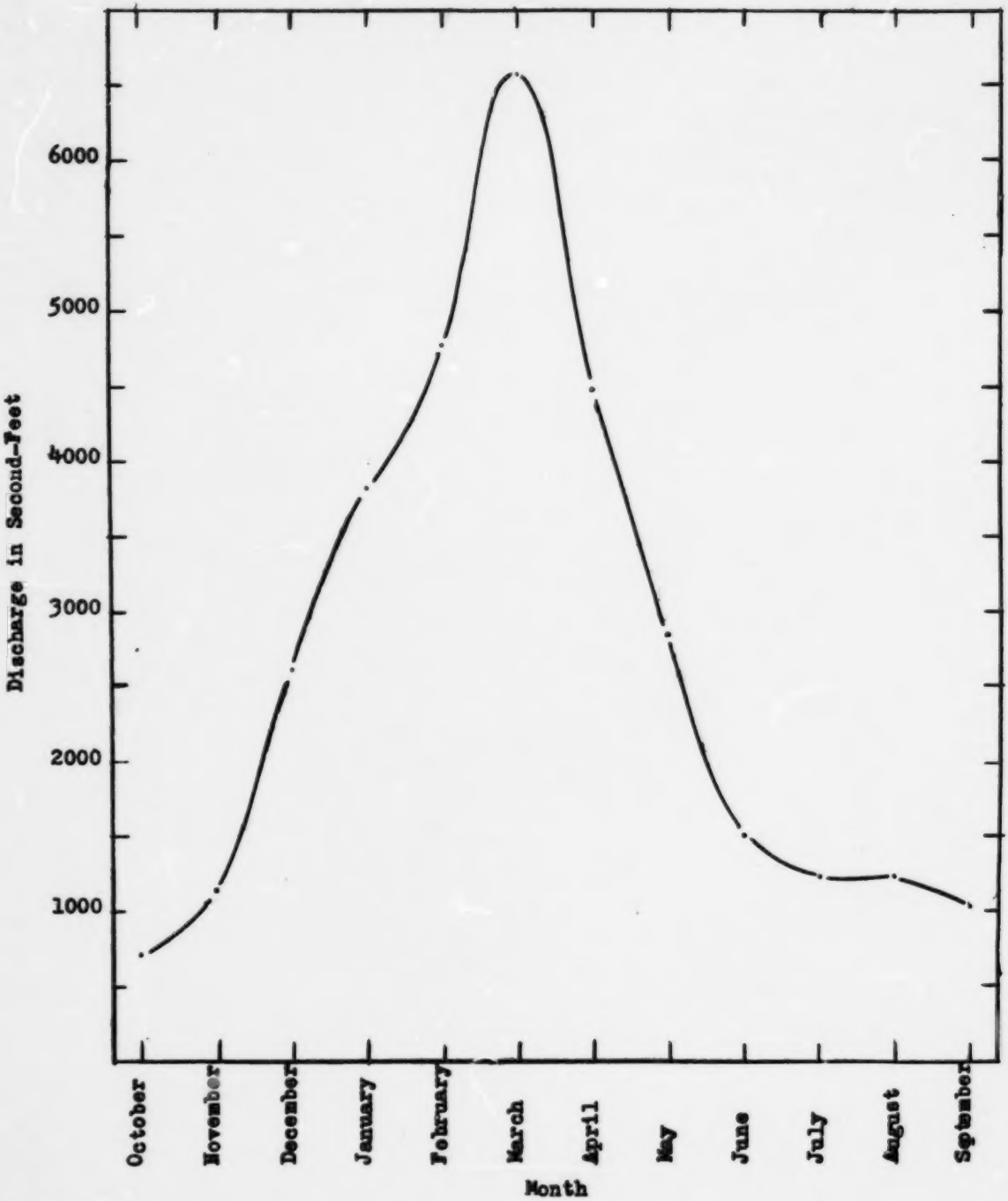
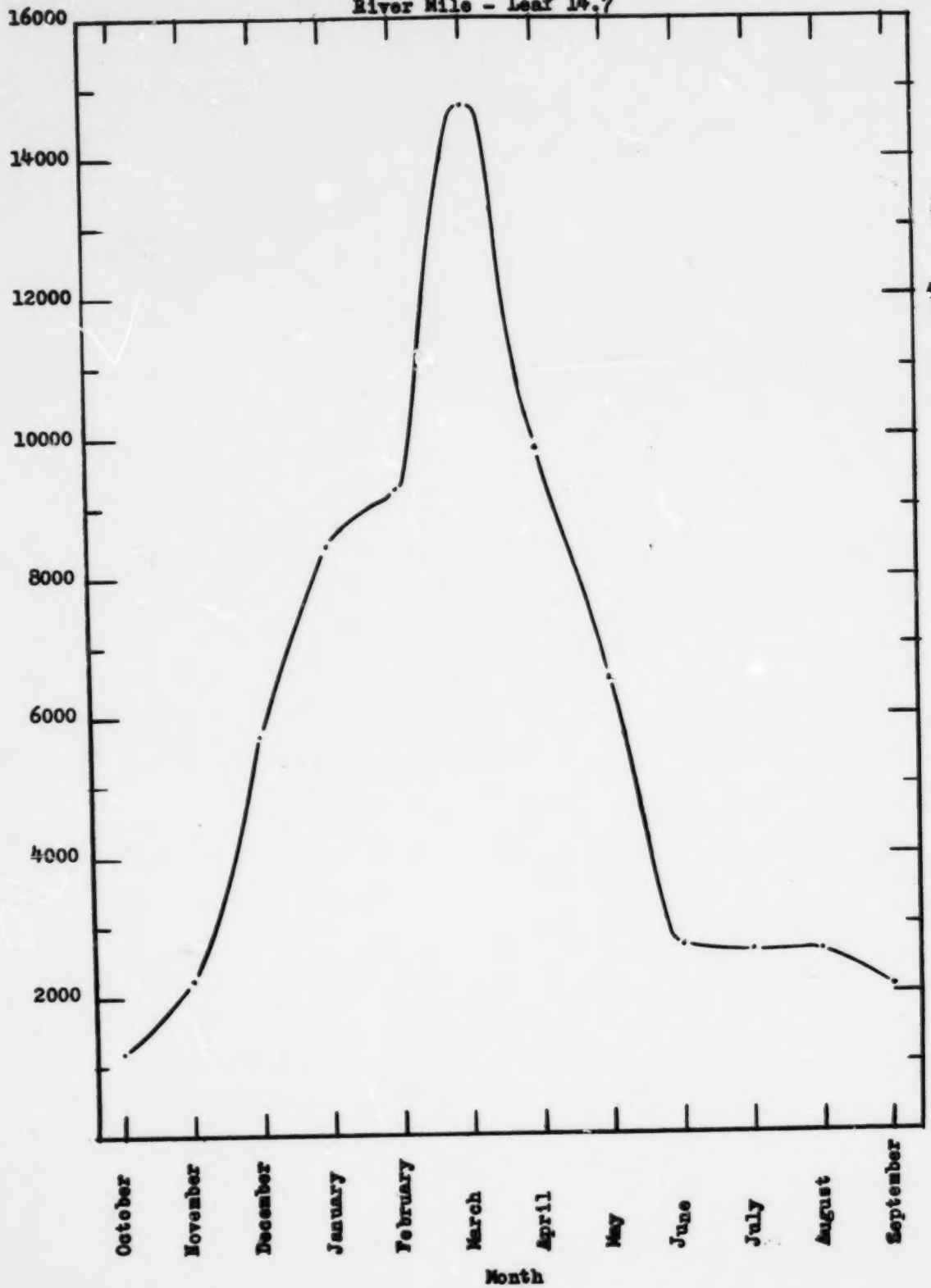


Figure 6

Monthly Average Discharge in Second-Feet
Leaf River Near McLain, Mississippi
(November 1939 - September 1948)
River Mile - Leaf 14.7



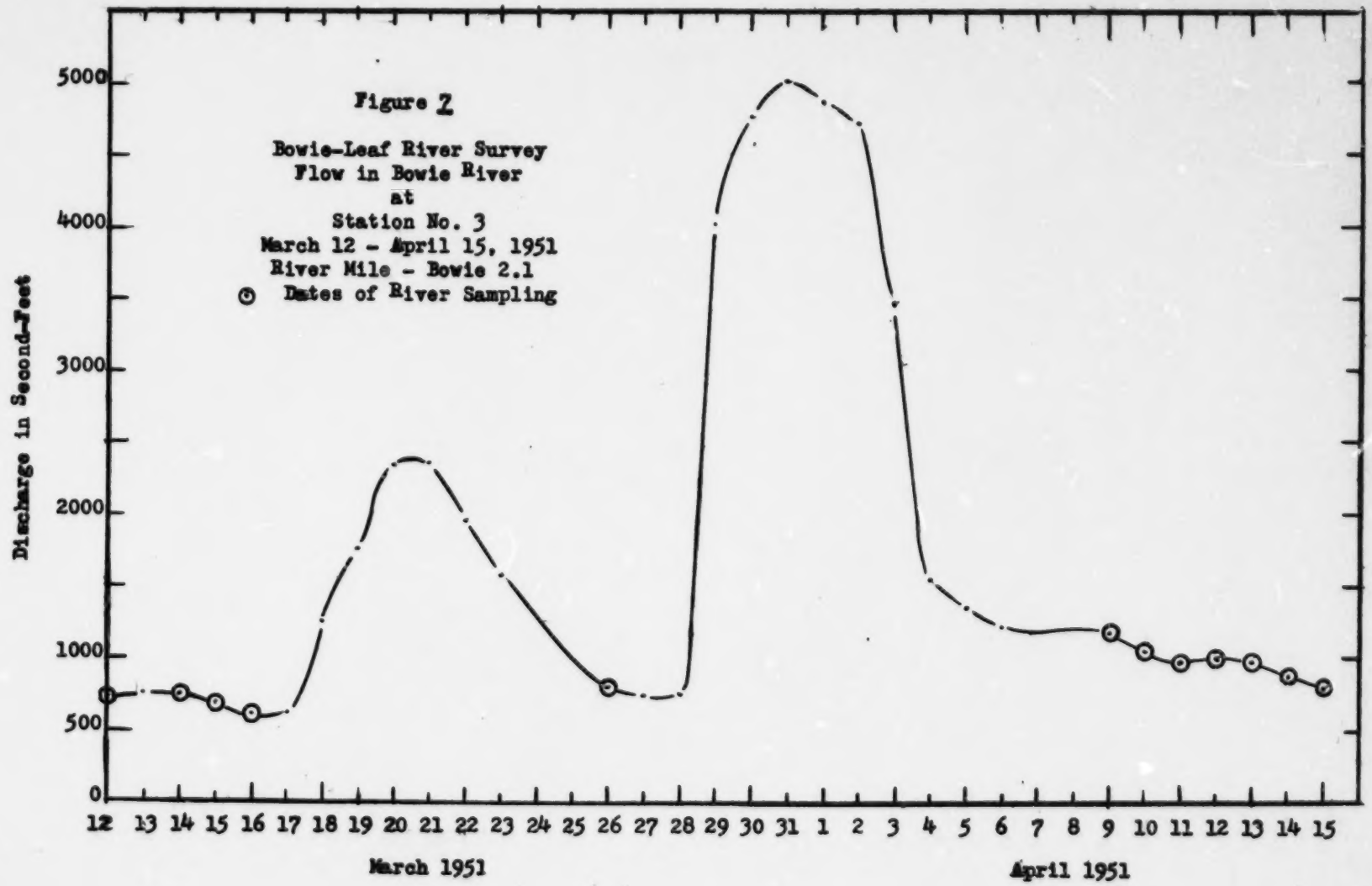


Figure 2
Bowie-Leaf River Survey
Flow in Bowie River
at
Station No. 3
March 12 - April 15, 1951
River Mile - Bowie 2.1
⊙ Dates of River Sampling
Discharge in Second-Feet
5000
4000
3000
2000
1000
500
0
12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
March 1951
April 1951

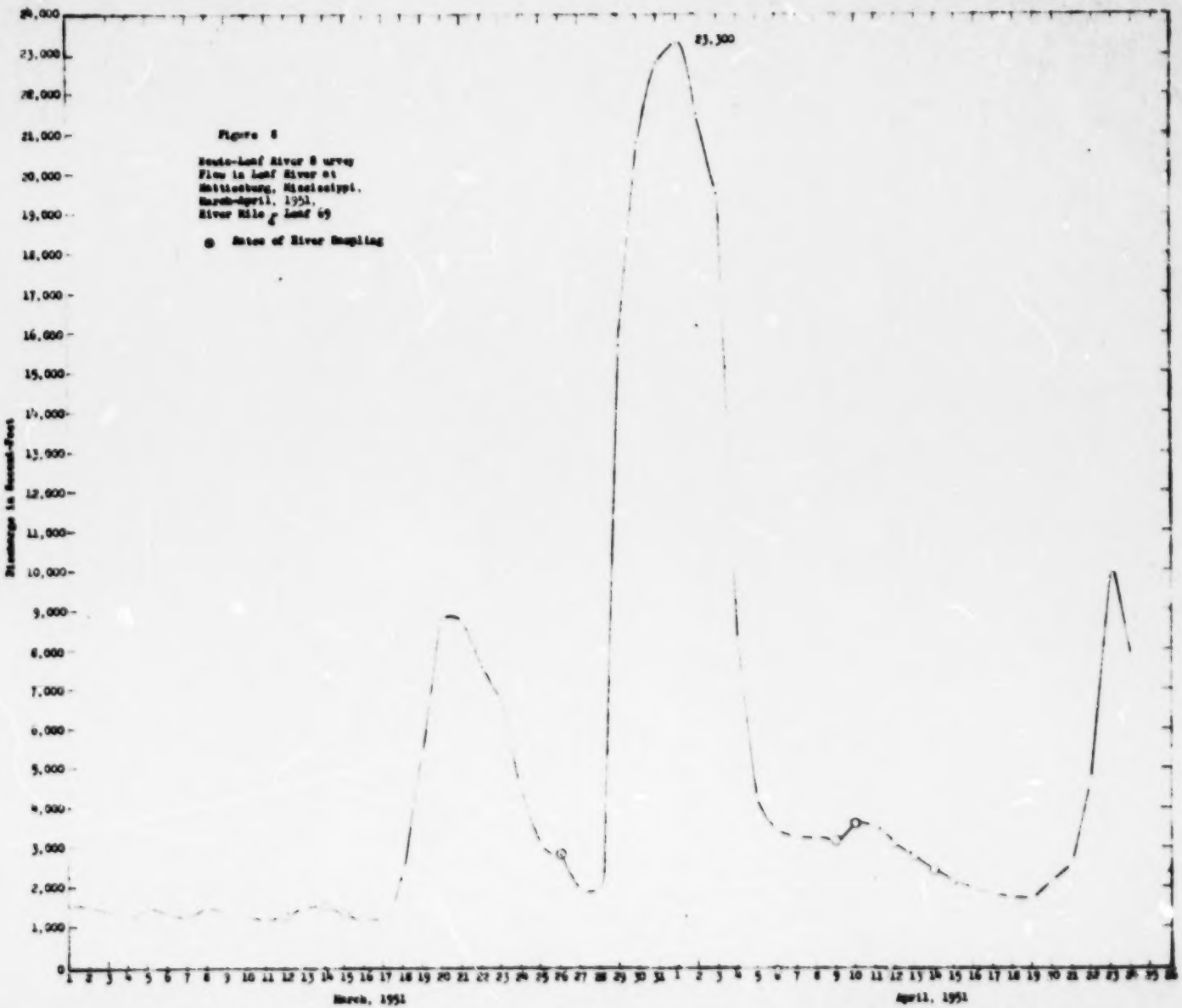
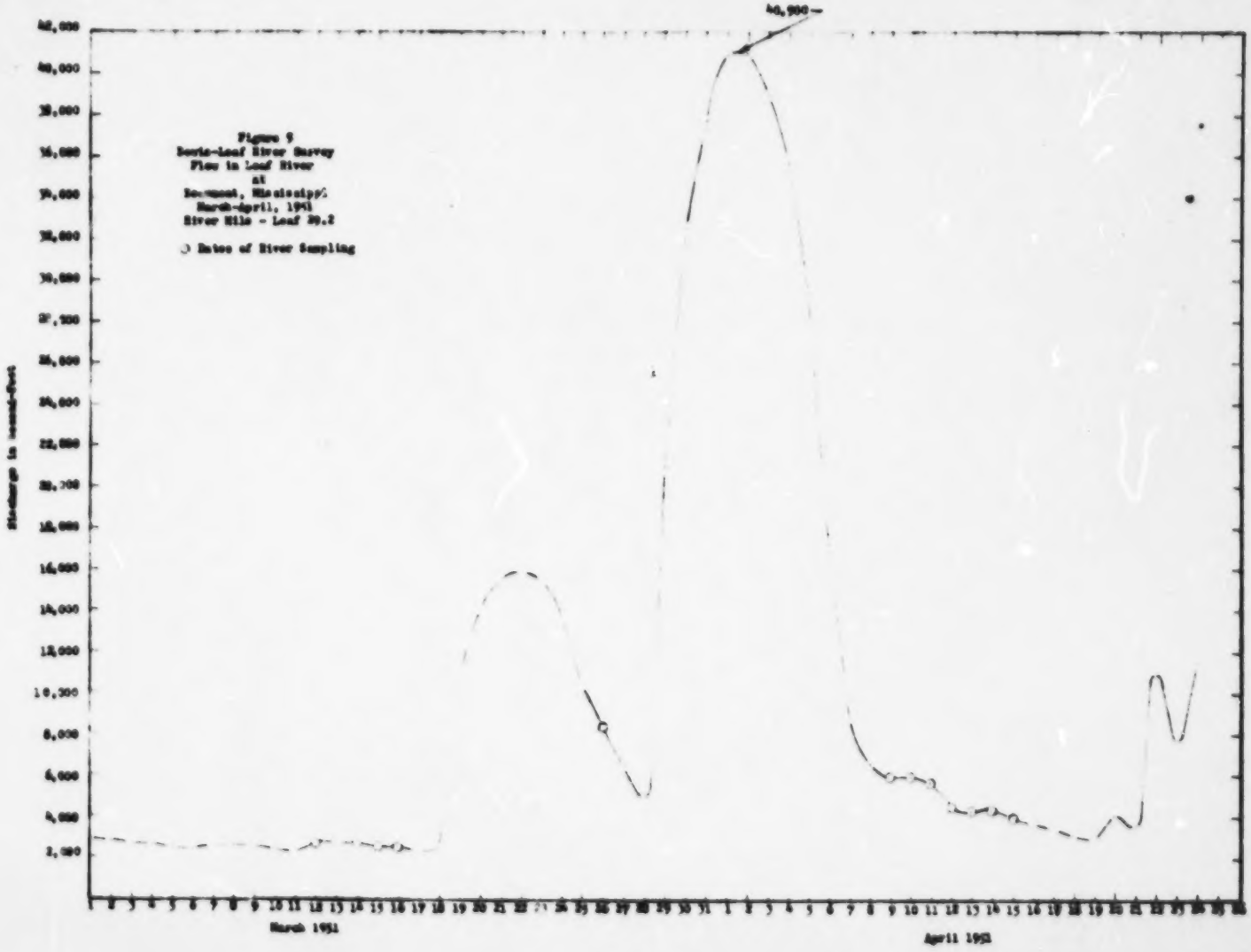


Figure 6
Hydro-Leaf River 8 urvey
Flow in Leaf River at
Hattiesburg, Mississippi,
March-April, 1951.
River Mile of Leaf 69
Dates of River Sampling
23,300
Discharge in Second-Feet
March, 1951
April, 1951


40,900
Figure 9
Leaf River Survey
Flow in Leaf River
at
Discharge in second-feet
Dates of River Sampling
March 1951
April 1951

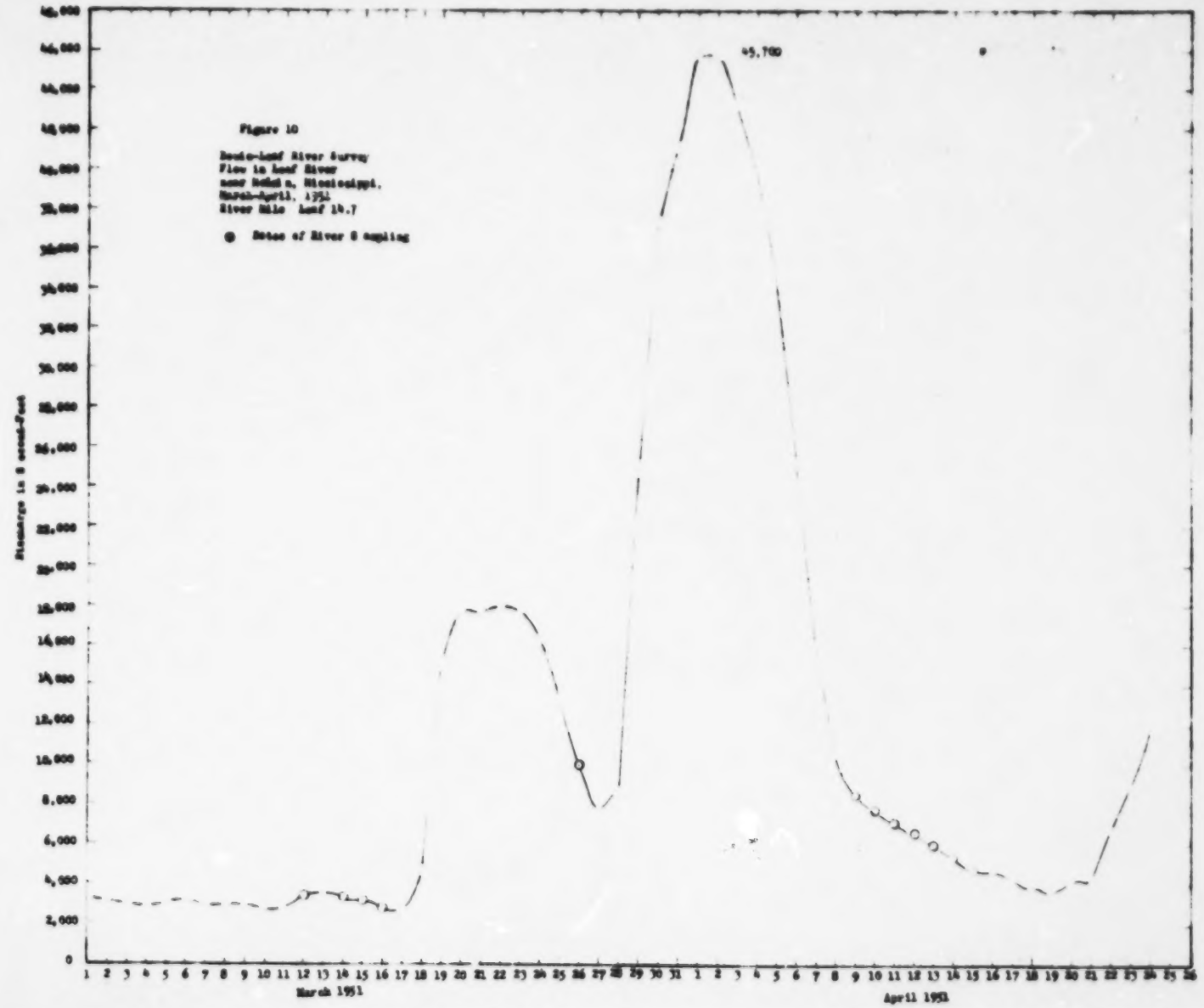


Figure 10
Bento-Leaf River Survey
Flow in Leaf River
near Rolla n, Mississippi.
March-April, 1951
River Mile Leaf 10.7
Dates of River S ampling
45,700
Discharge in S econd-Feet
0
2,000
4,000
6,000
8,000
10,000
12,000
14,000
16,000
18,000
20,000
22,000
24,000
26,000
28,000
30,000
32,000
34,000
36,000
38,000
40,000
42,000
44,000
46,000
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31
March 1951
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26
April 1951

TABLE 4

Leaf River Gage Readings and Discharge
U. S. Highway 11 Bridge
Hattiesburg, Mississippi

Date 1951	Gage Reading Ft.	Discharge cfs	Discharge MGD	Precipitation* inches	Date 1951	Gage Reading Ft.	Discharge cfs	Discharge MGD	Precipitation* inches
March 1	6.37	1600	1035		April 1	22.07	23300	15100	
2	6.32	1570	1015		2	21.23	21500	13900	
3	6.16	1430	925	0.04	3	20.37	19500	12600	
4	5.92	1270	810	1.19	4	13.08	8250	5340	
5	6.31	1570	1015		5	9.35	4250	2950	
6	6.11	1400	905	0.02	6	8.51	3480	2250	0.49
7	6.02	1330	860		7	8.29	3280	2120	0.25
8	6.33	1570	1015		8	8.28	3270	2110	0.01
9	6.20	1470	950		9	8.17	3180	2060	
10	6103	1350	875		10	8.67	3600	2330	0.01
11	5.93	1270	820	0.53	11	8.58	3550	2300	0.32
12	6.02	1330	860		12	8.07	3100	2000	
13	6.28	1540	955	0.22	13	7.77	2800	1810	
14	6.33	1570	1015		14	7.32	2430	1570	
15	6.09	1380	892		15	7.04	2200	1420	
16	5.96	1280	808		16	6.83	2000	1290	0.11
17	5.92	1270	820		17	6.64	1840	1190	
18	7.37	2500	1620	0.65	18	6.51	1740	1120	
19	10.66	5480	3540	2.60	19	6.50	1720	1110	0.60
20	13.62	8870	5730	0.11	20	7.00	2120	1370	
21	13.56	8760	5650		21	7.46	2550	1650	0.28
22	12.51	7600	4900		22	9.78	4630	2990	0.83
23	11.84	6800	4400		23	14.44	9900	6400	
24	9.67	4550	2940		24	12.72	7800	5040	
25	8.08	3100	2000						
26	7.81	2870	1850						
27	6.80	1970	1275	0.40					
28	6.84	2000	1290	1.23					
29	18.31	15700	10150	3.65					
30	20.94	20800	13450	Trace					
31	21.78	22800	14750						

Gage readings taken at 5:00 A.M.

*Precipitation is measured at the Hattiesbnng, Mississippi weather station and is for the period 7:00 A.M. on previous day to 7:00 A.M. on date shown.

Figure 11

Figure 11 is a map of the Hattiesburg area showing principl topographic features, and location of sampling stations established for this survey. Stream and waste sampling points are described below:

SAMPLING STATION NUMBER	LOCATION AND RIVER MILE ABOVE MOUTH OF STREAM	
1	Bowie River, 1/8 mile above Hercules stump washer effluent.	River mile 2.4
2	Hercules stump washer effluent creek at Bowie River.	River mile 2.25
3	Bowie River at Southern Railway bridge, 1/8 mile below stump washer effluent.	River mile 2.1
4	Bowie River, 250 feet above Hercules main plant effluent.	River mile 1.4
5	Hercules main effluent at plant	
6	Meridian Fertilizer Company, pond effluent before entering Hercules main effluent ditch .	
7	Hercules main effluent ditch, 1/8 mile before entering Bowie River.	
8	Bowie River, 3/8 mile below Hercules main effluent ditch	River mile 0.9
9	Bowie River 3/4 mile below Hercules main effluent ditch	River mile 0.6
10	Bowie River, 1/8 mile above confluence with Leaf River.	River mile 0.12
11	Leaf River, 1/8 mile above confluence with Bowie River	River mile 69.2
12	Leaf River at Mississippi Central Railroad bridge.	River mile 68.5
13	Leaf River at River Avenue bridge.	River mile 67.4

14	Leaf River, 2 miles below Hattiesburg, Mississippi Outfall Sewer.	River mile 65.6
15	Leaf River, 2 miles below Turpentine Creek (Dixie Pine Products effluent ditch).	River mile 61.8
16	Leaf River at McCallum, Mississippi Highway bridge	River mile 56.5
17	Leaf River at Mahned, Mississippi Highway bridge	River mile 47.1
18	Tallahala Creek, 1/4 mile before entering Leaf River.	
19	Leaf River at New Augusta, Mississippi Highway bridge.	River mile 42.2
20	Leaf River at Wingate, Mississippi Highway Bridge	River mile 37.3
21	Leaf River at Beaumont, Mississippi Highway Bridge.	River mile 29.2
22	Leaf River at McLain, Mississippi State Highway # 15 bridge.	River mile 14.7

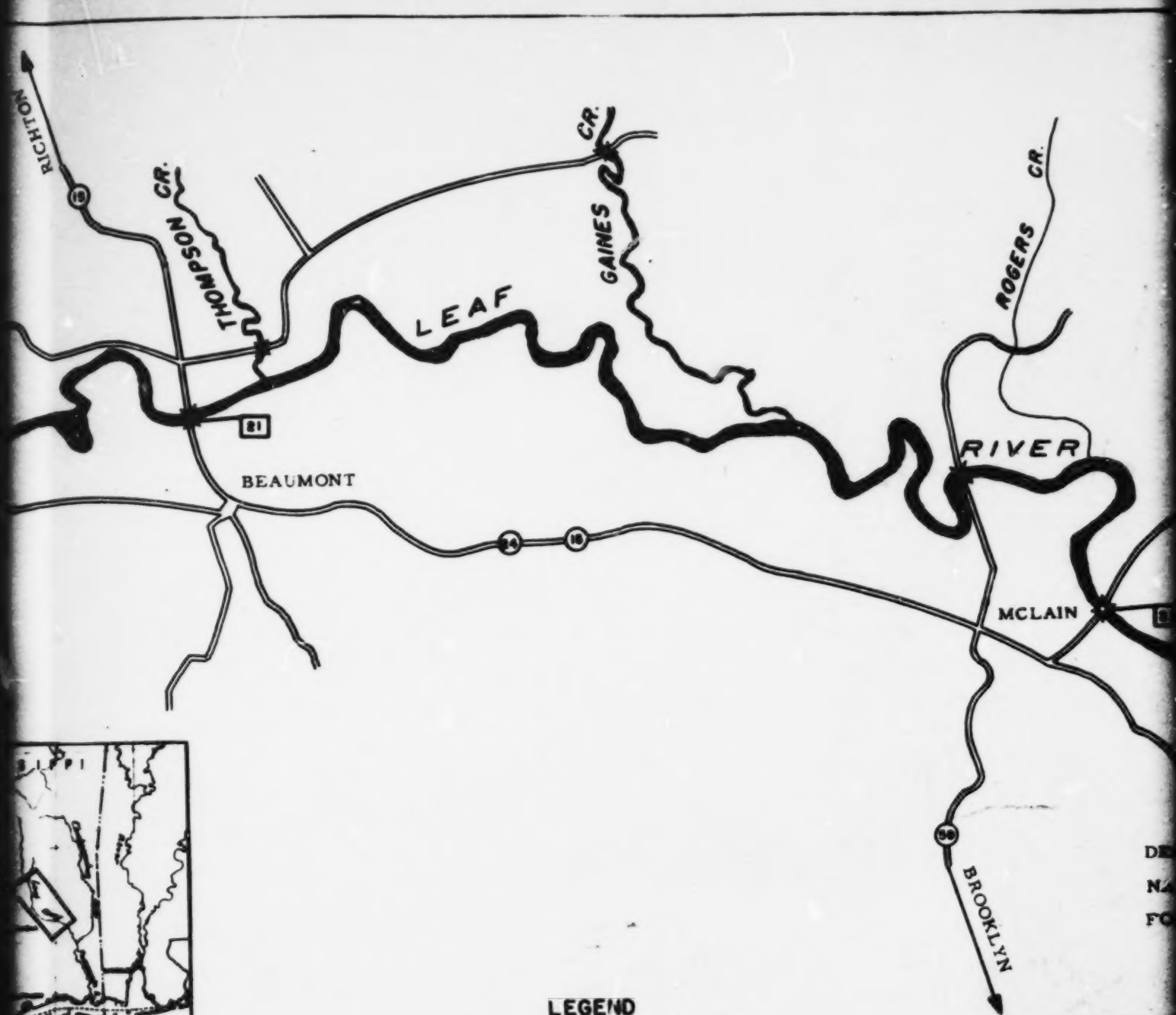
COLLINS
LAUREL
LEAF RIVER
RUNNELSTOWN
PETAL
BOWIE
RIVER
JACKSON
GORDON CR.
HATTIESBURG
LEAF
TURPENTINE
CR.
COLUMBIA
POPLARVILLE
GULF
N.O. & M.E. R.R.
49
42
11
13
14

LSTOWN
TALLAHALA
LEAF
RIVER
10
10
BELLEVILLE
MCCALLUM
PAGLAND
GULFPORT
BROOKLYN
BROOKLYN
B

RUNNELSTOWN
BOGUE HOMO
RICHTON
RIVER
WINGATE
FERGUSON
NEW AUGUSTA
MAHNED
WIGGINS
WIGGINS
CR.
SCALE
MILES
240 CHAINS
MISSISSIPPI
PROJECT AREA
LOCALITY

C

23.



LEGEND

SAMPLING STATION

D

BOWIE-LEA

LEAF RIVE

ENVIRONM

CINCINNATI, OH

DR. BY: C. M. A.

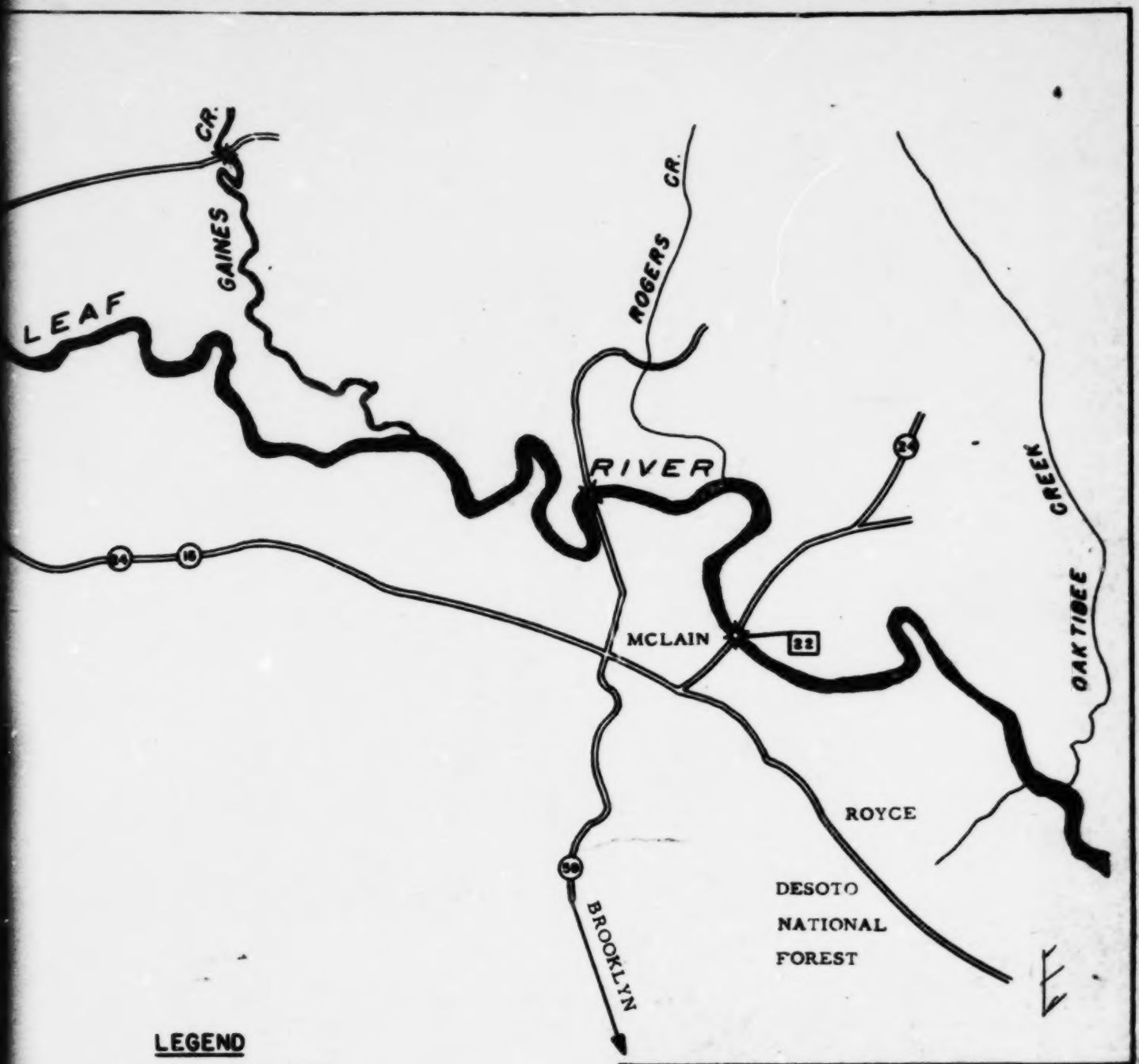


FIGURE II

BOWIE-LEAF RIVER INVESTIGATION

LEAF RIVER BELOW HATTIESBURG

ENVIRONMENTAL HEALTH CENTER

CINCINNATI, OHIO OCT., 1951

DR. BY: C.M.A. DRWG. NO.: FS-51-19

9. Laboratory Procedures

All or part of the following determinations were made on the samples collected:

Biochemical Oxygen Demand, 5-day, 20° C.
Dissolved Oxygen
Oxygen Consumed
Alkalinity
Acidity
pH
Phenols
Total Solids, Volatile and Fixed
Suspended Solids, Volatile and Fixed

The procedures followed in making the above analyses are in general as given in "Standard Methods for the Examination of Water and Sewage", 9th Edition, 1946. Modification of the procedure used for the determination of phenols and oxygen consumed are given in the appendix of this report.

EXPLANATION OF LABORATORY DETERMINATIONS

10. Biochemical Oxygen Demand (B.O.D.)

The biochemical oxygen demand of polluted waters or industrial wastes is the amount of oxygen required during stabilization of the decomposable organic matter by aerobic bacterial action. Since this is a phenomenon into which both time and temperature enter a standard set of conditions (5-day 20°C) is universally used for the test. For domestic sewage and some industrial wastes, approximately 68% of the oxygen requirements of the carbonaceous material present is normally satisfied during the standard test. For industrial wastes with variable carbon-nitrogen ratio, the oxygen demand may not follow the typical oxidation curve of domestic sewage.

The B.O.D. test is indicative of deoxygenation that will occur in waters receiving wastes. Oxygen deficiencies result in distress to fish and depletions result in noxious odor production.

11. Dissolved Oxygen (D.O.)

The quantity of dissolved oxygen at saturation depends considerably upon temperature, being 14.62 parts per million at 0°C. and 7.63 parts per million at 30°C. Fish and other aquatic life depend on oxygen dissolved in water for their life processes.

The minimum quantity for sustenance of desired fish species is considered to be 5 p.p.m. Dissolved oxygen is used by bacteria in oxidation of organic matter contained in the water to produce energy for growth and metabolism. If dissolved oxygen is utilized by such action faster than it is absorbed from the air a deficit of oxygen below saturation will result. This dissolved oxygen values below saturation are an indication of the presence of organic matter.

12. Oxygen Consumed

The oxygen consumed determination is a measure of the chemical oxidant required to oxidize the organic matter present in a sample under particular standard conditions. The test is of value in estimating the strength of certain industrial wastes, and in conjunction with the B.O.D. determination. It can be used where it would be advantageous to obtain results indicative of B.O.D. in less time than the B.O.D. test requires.

13. Alkalinity

Alkalinity of a water or liquid waste represents the carbonates, bicarbonates, hydroxides, and occasionally the borates, silicates, and phosphates. By use of phenolphthalein and methyl orange end points the amount of each type of alkalinity present can be determined. Methyl orange alkalinity is usually referred to as total alkalinity. Calcium and magnesium account for most of the alkalinity present in a sample. Results are expressed as parts per million calcium carbonate ($CaCO_3$).

14. Acidity

Acidity of water or waste is usually caused by the presence of uncombined carbon dioxide, mineral acids and salts of strong acids and weak bases. By using phenolphthalein and methyl orange indicators the amounts of each type of acidity present can be determined. Phenolphthalein acidity is usually referred to as total acidity, while methyl orange acidity is referred to as mineral acidity. Results are expressed as parts per million calcium carbonate ($CaCO_3$).

15. pH

The symbol pH denotes the negative logarithm (to the base 10) of the hydrogen ion concentration of a solution, this symbol being a universal one in chemistry. The pH value indicates the relative acidity or alkalinity of a water or waste, being lower with high degrees of acidity. It is a measure of the intensity rather than quantity. All pH determinations, during this survey, were made using a Beckman electrometric pH meter, Model G.

16. Phenols

The laboratory determination for phenols indicate the gross phenol content including cresols and higher phenols. These substances are found in variable proportions and amounts in certain industrial wastes.

Phenols in quantities as low as 0.002 to 0.005 parts per million in the presence of chlorine will produce chlorophenol (medicinal) tastes and odors in water. A concentration of 0.1 part per million of phenol alone imparts to water the characteristic taste and odor of phenol. In fish, phenol produces paralysis of neuro-muscular mechanism and hemolyses the blood.

17. Solids

The determination of solids included those for total and suspended solids as well as their volatile constituents. Total solids consist of all the solids present in a liquid. The term includes both suspended and dissolved solids. Suspended solids are in suspension or float on the surface of water, sewage or other liquid wastes, and are removed by laboratory filtration. Dissolved solids are found by subtracting suspended solids from total solids. Volatile solids are those that are lost upon ignition of total solids (giving total volatile solids) or suspended solids (giving suspended volatile solids). Fixed solids are determined by subtracting total volatile solids from total solids (giving total fixed solids) or suspended volatile solids from total suspended solids (giving fixed suspended solids). Volatile solids represent approximately the amount of organic matter and fixed solids the inorganic matter in a water or liquid waste.

DISCUSSION OF RESULTS

The mean results obtained during the period March 12 to March 16 1951 are presented in Table 5. Also included in Table 5 are the mean results obtained during the sampling period March 21 to April 15. Because of high flows, approaching flood levels, that occurred March 29 through April 4, some variations in the two sets of data have resulted which makes averaging all data together inadvisable.

Tabulation of individual results for all sampling stations are included in the appendix of this report.

18. Biochemical Oxygen Demand

Results of sampling Bowie River show an increase in 5-day B.O.D. of 15,730 pounds. This increase can almost entirely be traced to industrial wastes being discharged by Hercules Powder Company. The 5-day B.O.D. of the stream averaged 1,770 pounds above the Hercules plant and 17,500 pounds before the confluence with the Leaf River. The total B.O.D. load discharged by the plant, during the survey, averaged 16,600 pounds. Adding to this figure the initial B.O.D. of the stream gives a total of 18,400 pounds. Subtracting the 5-day B.O.D. of the stream, (17,500 pounds) before joining the Leaf River, gives an apparent reduction in 5-day B.O.D. of 900 pounds.

TABLE 5

NOYES-LEAF RIVER SURVEY - DATA SUMMARY SHEET
United States Public Health Service

MEAN RESULTS

Sampling Period	Sampling Station Number	River Mile	Temperature Degrees C.	Dissolved Oxygen		B.O.D. 5-Day, 20° C		pH Range	Oxygen Consumed	Total Alkalinity	Phenols		TOTAL SOLIDS						SUSPENDED SOLIDS					
													Total		Volatile		Fixed		Total		Volatile		Fixed	
				P.P.M.	% Sat.	P.P.M.	Lbs/ Day		P.P.M.	P.P.M.	P.P.B.	Lbs/Day	P.P.M.	Lbs/Day	P.P.M.	Lbs/Day	P.P.M.	Lbs/Day	P.P.M.	Lbs/Day	P.P.M.	Lbs/Day	P.P.M.	Lbs/Day
March 12-16, 1951	2	R- 2.25	17	5.7	57	64	930	5.6-6.4	410	11.1	-	-	975	3510	318	1140	657	2370	726	2610	255	920	471	1690
	3	R- 2.1	14	9.6	92	0.7	9940	6.5-6.8	12.6	11.8	-	-	74	779600	24	91200	50	188400	14	52100	6	20100	8	32000
	5	-	27	0	0	298	12200	4.3-7.3	194	39	-	-	277	11328	90	3660	187	7660	109	4440	38	1530	71	2910
	6	-	7	11.1	93	5.6	0.2	2.5-3.6	35	298*	-	-	480	16	130	4	350	12	155	5.3	23	0.5	132	4.8
	7	-	24	2.3	27	304	12400	5.4-8.3	414	40	-	-	284	11600	88	3580	196	8020	121	4940	37	1520	84	3420
	10	R-0.12	13	9.4	86	3.9	15900	6.2-7.1	20	10	-	-	84	322000	28	110000	56	212000	17	67000	9	34000	8	33000
	11	L-69.2	13	9.8	93	1.2	4910	6.3-7.1	-	18	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	12	L-68.5	12	9.5	88	2.2	16700	6.8-7.1	-	15	-	-	-	-	-	-	-	-	-	-	-	-	-	-
March 20, - April 15, 1951	1	R-2.4	16	9.1	92	0.4	1770	6.3-7.5	12.9	9.0	10	62	67	351000	19	98000	48	253000	22	117000	9	47000	13	7000
	2	R-2.25	24	2.7	29	93	395	4.3-6.4	-	8.6	-	-	1540	5560	540	1940	1000	3620	1222	4400	395	1430	827	2970
	3	R-2.1	17	9.1	93	0.6	2620	6.1-7.0	10.2	8.9	-	-	79	341000	37	159000	42	181100	18	77400	11	47400	7	30200
	4	R-1.4	17	6.9	91	0.5	2460	6.7-7.1	-	-	7	40	62	360800	30	116000	32	244800	16	95600	2	10000	14	85800
	7	-	30	1.2	16	400	16300	3.7-9.8	601	66	250	12	417	17030	104	6700	253	10330	100	4530	83	3380	77	3150
	8	R-0.3	17	6.0	66	4.3	22400	6.4-6.9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	9	R-0.8	17	6.5	86	3.7	19600	6.6-7.0	-	-	11	65	-	-	-	-	-	-	-	-	-	-	-	-
	10	R-0.12	17	6.5	87	3.4	17500	6.6-6.9	17.3	12.0	10	60	56	299000	21	11100	35	188000	22	120000	8	42000	14	78000
	11	L-69.2	16	9.0	90	0.7	7700	6.7-7.0	-	15.0	5	68	116	1502000	32	425000	84	1077000	17	729000	7	89000	50	634000
	12	L-68.5	17	6.8	89	1.7	26300	6.0-6.7	17.7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	13	L-67.4	17	8.7	89	1.6	24700	6.6-6.9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	14	L-65.6	17	6.6	68	1.7	26600	6.5-6.8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	15	L-61.6	17	8.4	87	1.5	23400	6.7-6.8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	16	L-56.5	17	8.6	88	1.1	16300	6.5-6.8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	17	L-47.1	17	8.3	86	1.1	16300	6.5-6.7	-	-	-	-	66	893000	18	255000	48	638000	31	419000	3	36000	28	379000
	18	-	17	9.6	98	47	371000	6.3-6.9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	19	L-42.2	17	7.2	74	5.1	176000	6.4-6.6	-	-	-	-	101	2123000	42	923000	59	1200000	40	842000	12	269000	-	579000
	20	L-37.3	16	7.1	74	4.8	136000	6.4-6.7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	21	L-29.2	16	7.0	72	4.1	109000	6.3-6.8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	22	L-14.7	17	6.8	71	3.4	120000	6.1-6.5	-	-	-	-	98	2853000	30	684000	68	1969000	36	1055000	4	117000	32	938000

TOTAL ACIDITY

The initial B.O.D. of the stream (1,770 pounds) was partially due to the Hattiesburg Meat Packing Company whose outfall sewer was located about one mile upstream from the Hercules plant. The only other contributing source to the stream, in this stretch, was the Meridian Fertilizer Company effluent which had an insignificant 5-day B.O.D. load of less than one pound per day.

Leaf River above the confluence with Bowie River had an average 5-day BOD of 7,700 pounds. Adding to this figure the 17,500 pounds from the Bowie River gives a total 5-day B.O.D. of 25,200 pounds to be expected in the stream below the confluence. The results of sampling at a point 3,000 feet downstream from the confluence showed a 5-day B.O.D. of 26,300 pounds, The B.O.D. load steadily decreased at all sampling points downstream except at Station 14, 2 miles below Hattiesburg and Petal, Mississippi sewer outfalls, where an increase of 1,900 pounds was noted. At Station 17, Mahned, Mississippi, the 5-day B.O.D. averaged 18,300 pounds or a decrease of 8,000 pounds (30 per cent) in 21.4 river miles.

Tallahala Creek which empties into Leaf River one-half mile below Mahned had an average 5-day B.O.D. of 373,000 pounds. At New Augusta, Mississippi, 4.5 miles below Tallahala Creek the B.O.D. in Leaf River had increased to 125,000 pounds. At McLain, Mississippi, 27.5 miles below New Augusta (32 miles below Tallahala Creek) the 5-day B.O.D. was 120,000 pounds or a reduction in this stretch of only 5,000 pounds.

B.O.D. profiles for the Bowie and Leaf Rivers are presented in Figures 12 and 16.

19. Dissolved Oxygen

The minimum dissolved oxygen observed in Bowie and Leaf River samples was 6.0 ppm at McLain, Mississippi on April 9. Dissolved oxygen concentration decreased from an average of 9.0 p.p.m. at Station 1 to 6.8 p.p.m. at Station 22. The greatest rate of depletion occurred between Stations 17 and 19 where the D.O. decreased from 8.3 to 7.2 p.p.m. This decrease was due to the flow from Tallahala Creek which entered Leaf River in this stretch and had an average D.O. concentration of 5.6 p.p.m. The point of maximum dissolved oxygen depletion, in the Leaf River, was not located during this survey. The lowest D.O. concentration was found at McLain, which was the farthest downstream sampling station. Maximum depletion probably occurred downstream from this point.

Figures 12, 14, and 15 show the dissolved oxygen profiles for the Bowie and Leaf Rivers.

20. Solids

Results from sampling Hercules plant effluents show that these wastes discharge to Bowie River 22,600 pounds of total solids per day. Bowie River above the plant had an average of 351,000 pounds of total solids, about one-third of these solids were suspended. Bowie River before confluence with the Leaf River had an average of 311,000 pounds of total solids. Adding the amount of solids discharged by Hercules effluents to the total solids carried in the stream gives a total of 373,600 pounds. Subtracting the amount in the stream before entering Leaf River (311,000 pounds), shows an apparent decrease of 62,600 pounds of total solids. The settling out of some material in the Bowie River is from physical inspection, an obvious fact. Wood fibers are in evidence in heavy sludge deposits in the stream.

Figure 12

Bowie-Leaf River Survey
Bowie River
Stations 1 through 10
Oxygen Studies

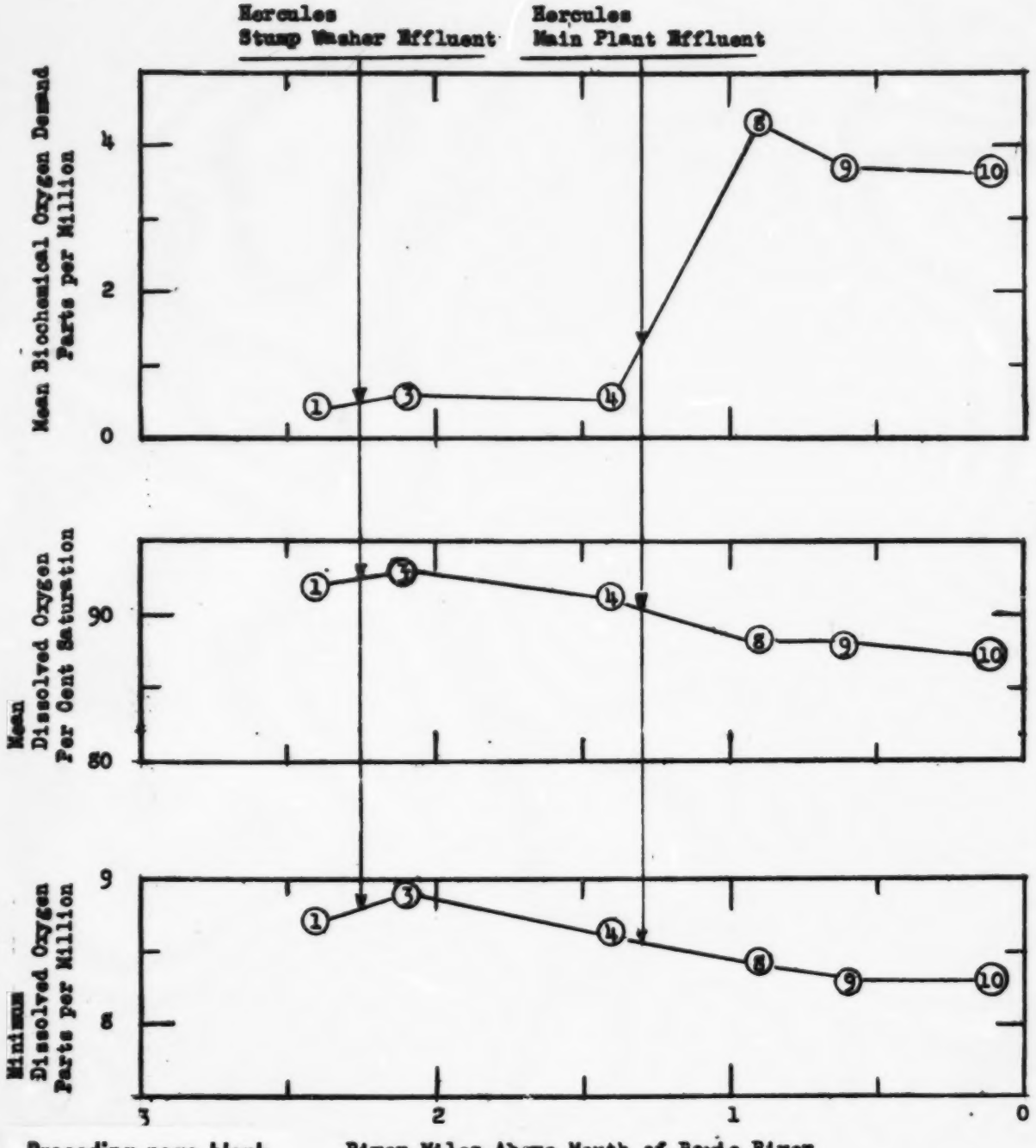


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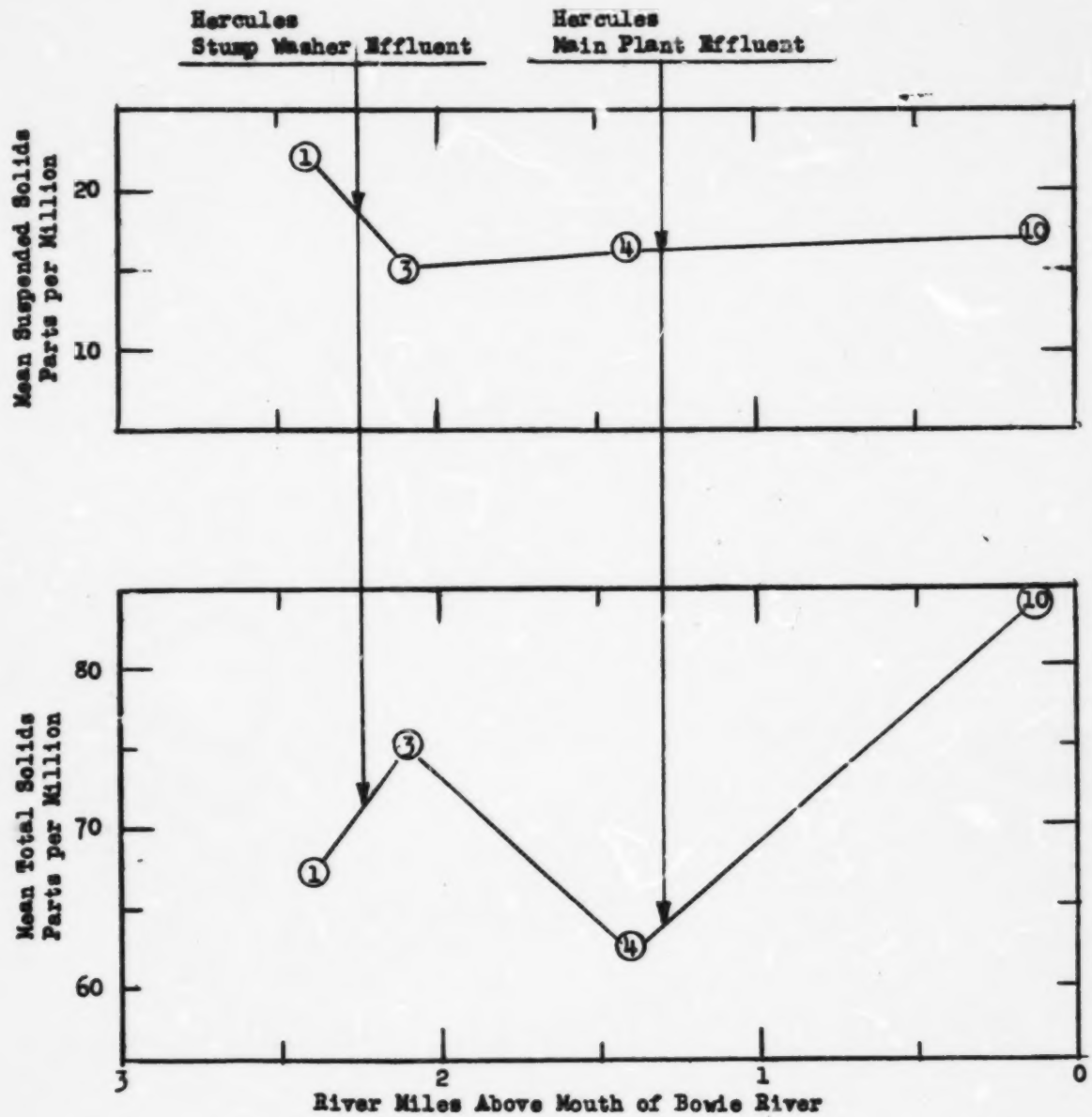
Figure 13

Bowie-Leaf River Survey
Bowie River
Stations 1 through 10
Solids Studies



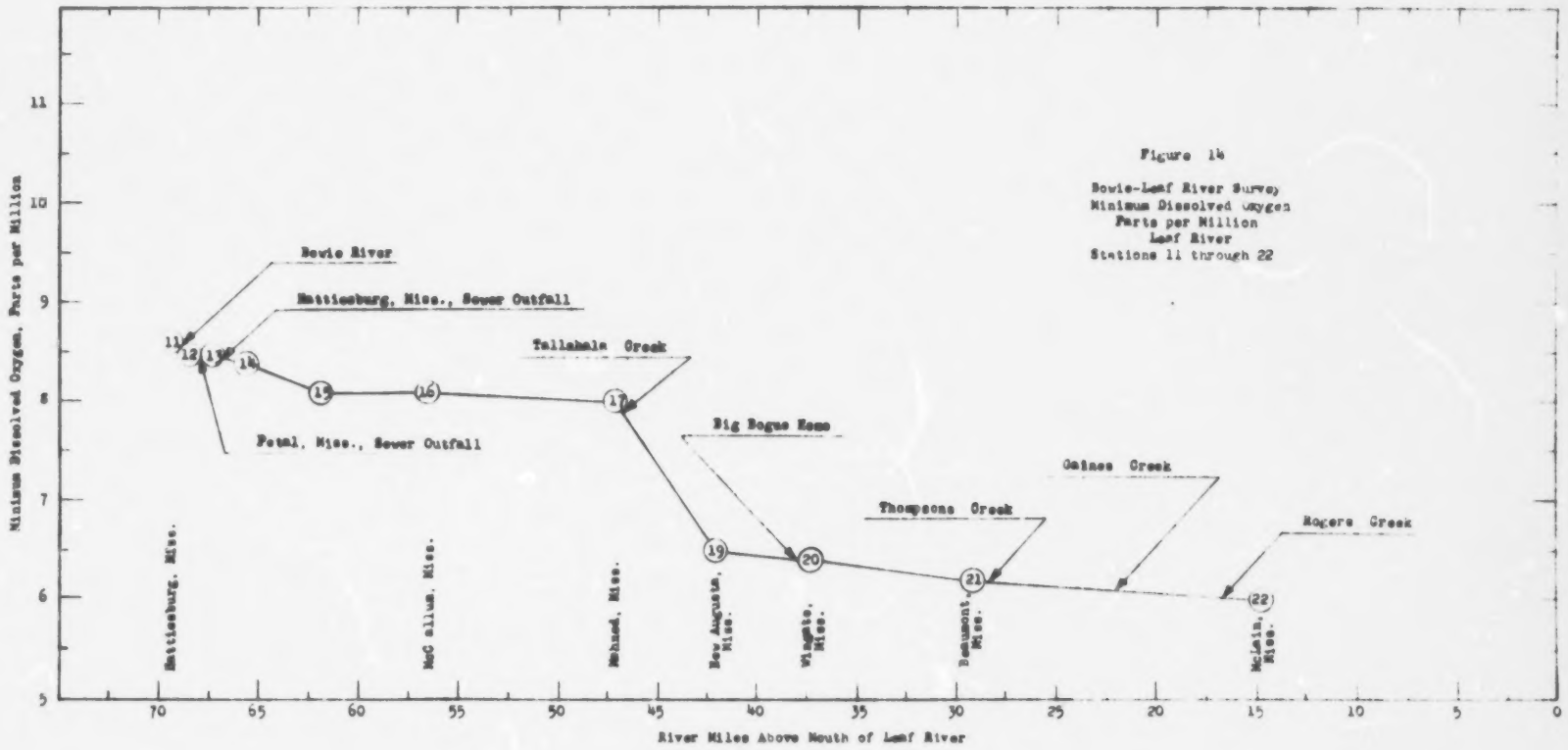


Figure 14

Bowie-Leaf River Survey
Minimum Dissolved Oxygen
Parts per Million
Leaf River
Stations 11 through 22

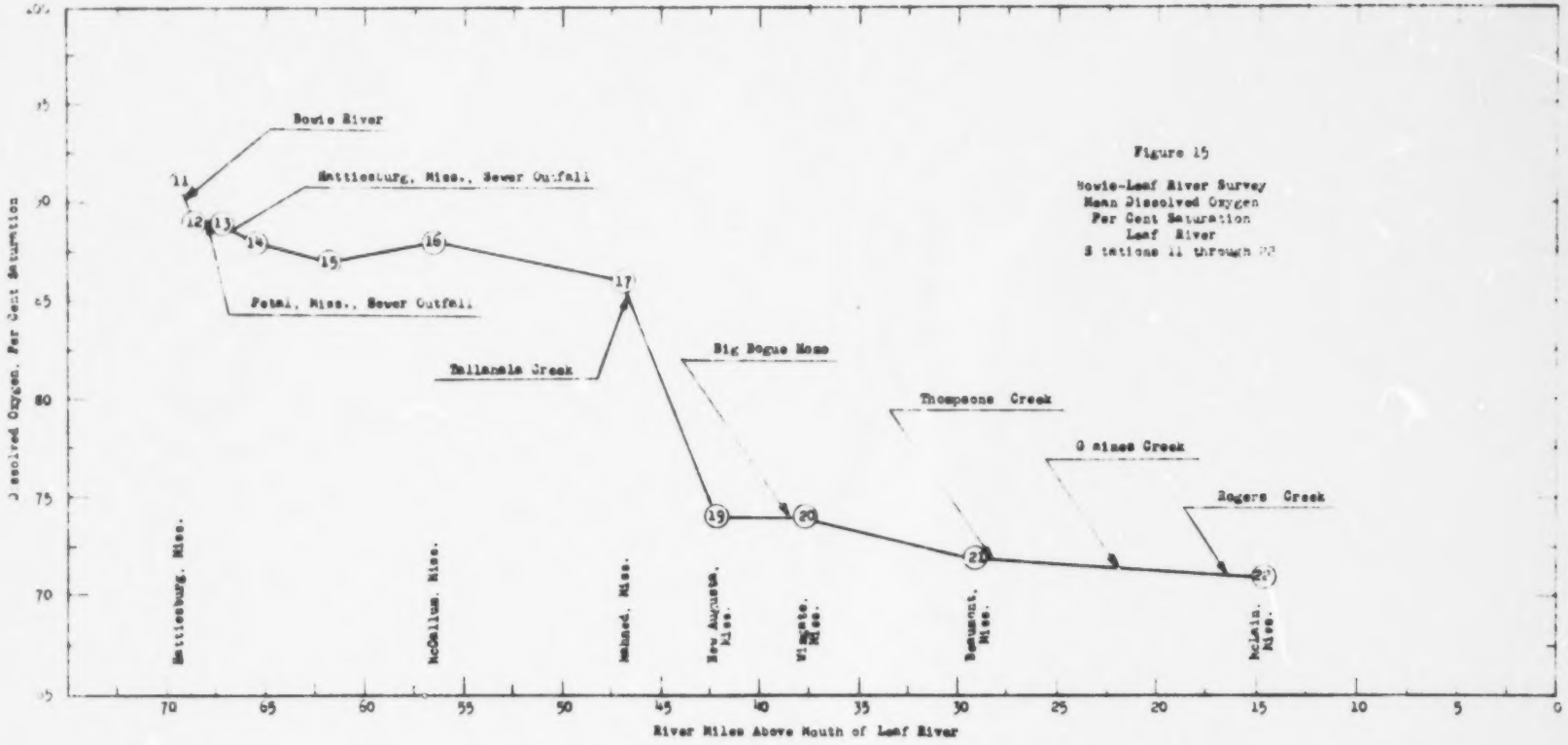


Figure 15

Bowie-Leaf River Survey
Mean Dissolved Oxygen
Per Cent Saturation
Leaf River
Stations 11 through 22

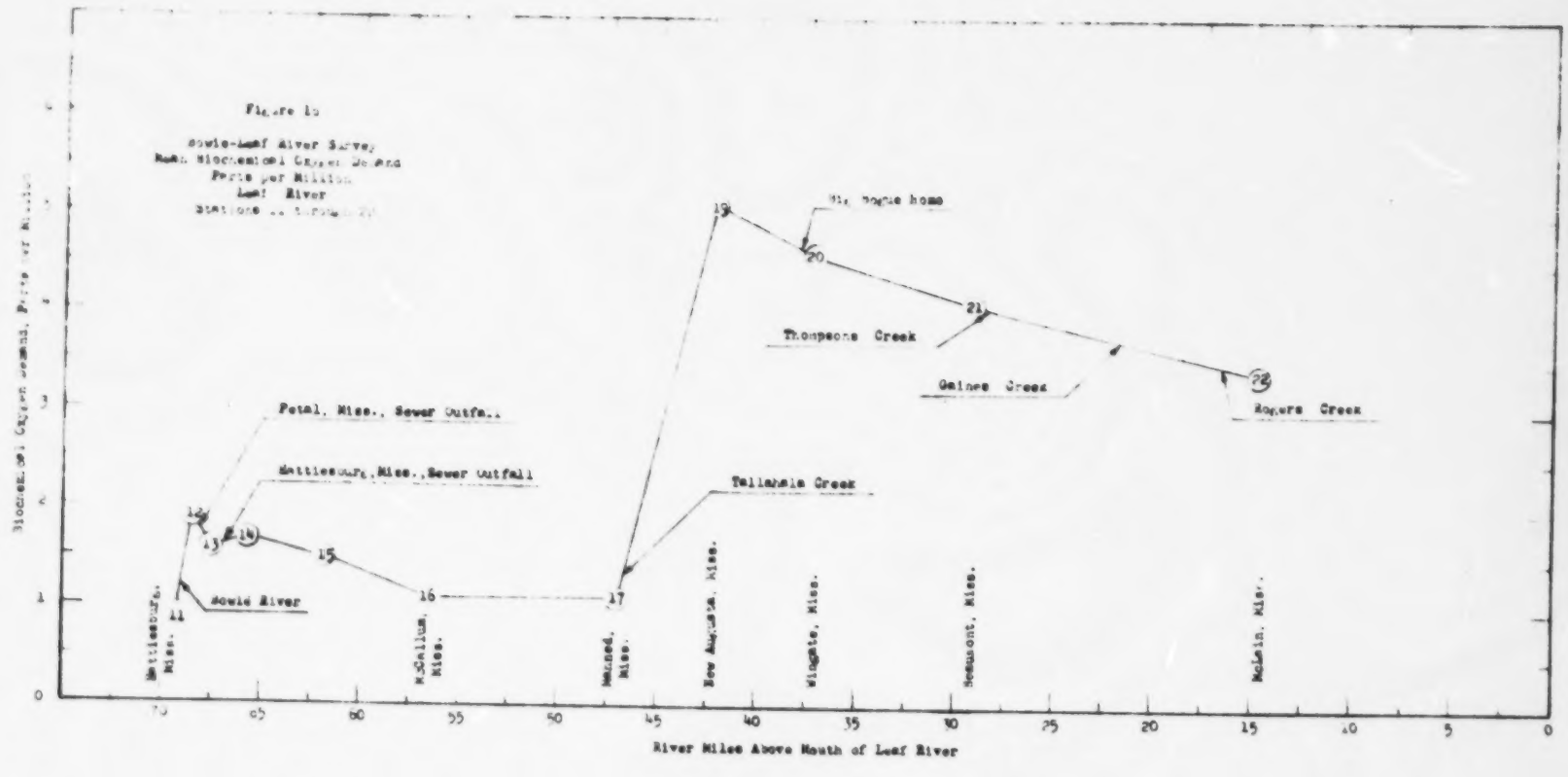


Figure 10
Petal, Miss., Sewer Outfa..
Hattiesburg, Miss., Sewer Outfall
Leaf River
Thompsons Creek
Gaines Creek
Rogers Creek
Tallahala Creek
Mr. Boggie home
Hattiesburg, Miss.
McCallum, Miss.
Heidelberg, Miss.
New Augusta, Miss.
Wiggins, Miss.
Beaumont, Miss.
Mclain, Miss.
River Miles Above Mouth of Leaf River

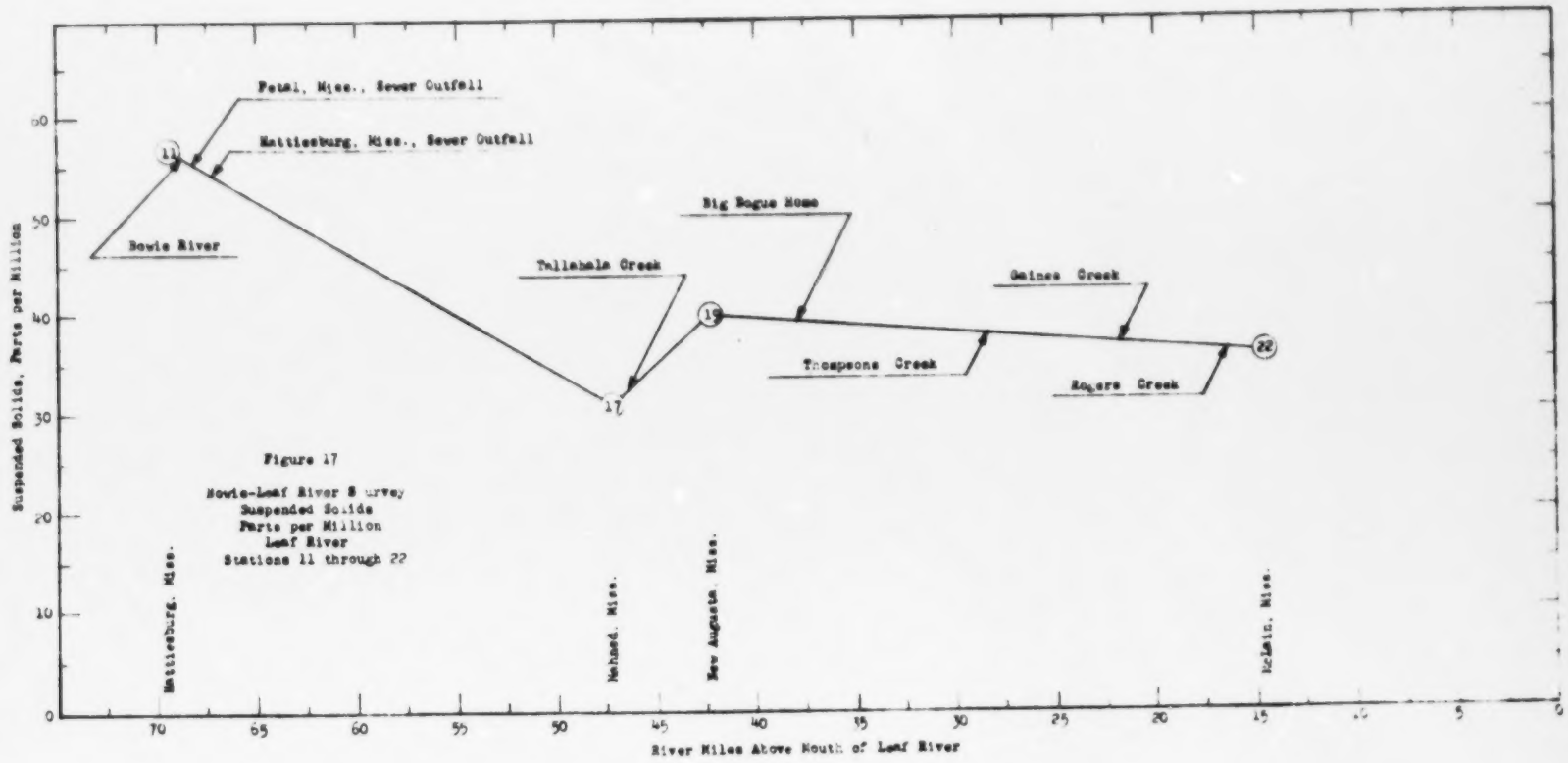


Figure 17

Bowie-Leaf River Survey
Suspended Solids
Parts per Million
Leaf River
Stations 11 through 22

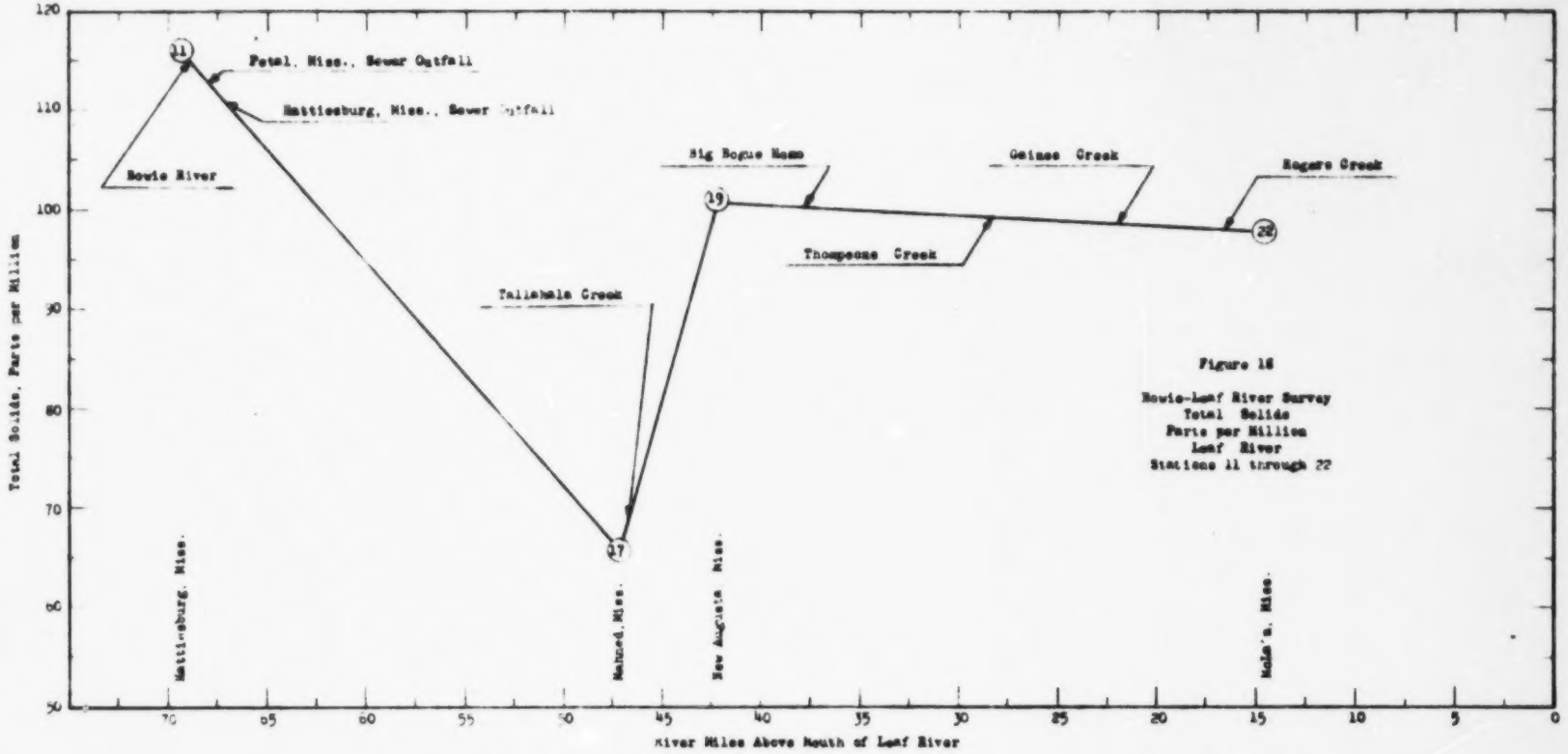


Figure 16

Bowie-Leaf River Survey
Total Solids
Parts per Million
Leaf River
Stations 21 through 22

Projection of B.O.D. and D.O. Data to Low-Flow High-Temperature Conditions.

The amount of oxygen capable of being dissolved in water depends upon temperature, pressure, and concentration of certain solids. The most important single factor that affects dissolved oxygen concentrations in natural streams is temperature. Higher temperatures decrease the oxygen carrying capacities of a stream and at the same time increase the metabolic activity of bacteria and other micro-organisms which results in a more rapid oxygen use. In a stream, this factor is largely offset by greater rates of surface aeration as the dissolved oxygen decreases.

A second important factor in dissolved oxygen concentrations is the quantity of water in a stream. With a constant quantity of polluting matter discharging into a stream, the amount of oxygen required by the waste for stabilization will remain fairly constant, but the amount of oxygen available will decrease as the flow decreases. This results in a greater oxygen deficit below saturation at lower flows.

The conditions of high-temperatures and low-flows are associated with maximum oxygen depletion. The combination of physical factors producing oxygen depletion sufficient to damage aquatic life may occur only infrequently, however even short duration oxygen depletions may seriously affect the biological balance of a stream for long periods of time.

Oxygen deficit predictions are based on an analysis of flow records to determine the frequency of occurence of low flows during high temperatures months and on an extension of the biochemical oxygen demand and dissolved oxygen data collected during stream surveys. The method employed for extending the B.O.D. and dissolved oxygen data is dependent upon using the information to determine values of exponents in certain mathematical formulas which have been developed for expressing the oxygen depletions phenomena or oxygen sag curve. These formulas are based on the principal that under any set of conditions the rate of biological oxidation is a function of the concentration of the biochemical oxygen demanding substances and the rate of reaeration is dependent upon the oxygen deficiency in the stream. Certain conditions must be assumed to remain constant such as the amount and character of polluting matter entering the stream.

Through use of this method, estimates can be made of the minimum dissolved oxygen to be expected at flows and temperatures other than those found at time of sampling.

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2. "Ground-Water Resources of Mississippi," Water Supply Paper No. 576, U.S.G.S., Washington, D.C., 1928.

3. "Recommendation of the Abandonment of the Leaf-Chickasawhay River Projects," House Document No. 1723, 64th Congress, 2nd Session, U. S. Government Printing Office, Washington, D.C.

4. Climatological Data for the United States (monthly bulletin published for each State by the U. S. Weather Bureau, Washington, D.C.).

5. "Stream Sanitation," by Earle B. Phelps, John Wiley and Sons, Inc., New York, N.Y., 1944.

Appendix

Dichromate Reflux Method for Determination of Oxygen Consumed

A. Special Apparatus

(1) Reflux apparatus, consisting of a 300-ml. round-bottomed flask with a 24/40 taper-joint neck connected with a Friedrich's reflux condenser.

B. Reagents and Solutions

(1) Potassium dichromate, 0.2500 N

(2) Sulfuric acid, concentrated

(3) Ferrous amonium sulfate, 0.2500 N

(4) Indicator, O-phenanthroline ferrous complex

C. Procedure

(1) Dilute an appropriate amount of sample to 50 ml. with distilled water in a 300-ml. round-bottomed flask with a taper-joint neck.

(2) Add 25.0 ml. of 0.2500 N potassium dichromate and 75 ml. of concentrated sulfuric acid. For the best quantitative results, use 50% by volume sulfuric acid.

(3) Reflux for two hours.

(4) Cool, transfer the mixture to an Erlenmeyer flask and titrate the excess potassium dichromate with approximately 0.2500 N ferrous ammonium sulfate, using o-phenanthroline ferrous complex as an indicator.

(5) Reflux a blank at the same time, using the same amount of reagents and substituting 50 ml. of distilled water for the sample.

(6) The ferrous ammonium sulfate must be standardized daily.

D. Calculation

$$\text{O.C, p.p.m.} = \frac{(a-b) \times \text{normality (standard Fe)} \times 8000}{\text{Volume of sample}}$$

where O.C. = oxygen consumed

a = ml. of ferrous ammonium sulfate used for blank.
b = ml. of ferrous ammonium sulfate used for sample.

Determination of Phenol

A. Special Apparatus

(1) One-liter separatory funnels

(2) Distillation apparatus:

One-liter Pyrex distilling flask #3660, with Graham condensers or equivalent. Equipment must be all-glass with ground-glass stoppers.

B. Reagents and Solutions

(1) Copper Sulfate, 10% soln.

(2) Phosphoric acid, 10% soln.

(3) Chloroform, C.P. (U.S.P. chloroform is not acceptable)

(4) Sodium hydroxide, 0.1 N

(5) Sodium chloride, fine-grained, C.P.

C. Preliminary Screening Procedure

(1) Add 2 ml. of 10% $CuSO_4$ soln. to 250 ml. of sample and adjust the pH of the soln. to less than 4.0 by addition of 10% H_3PO_4.

(2) Place mixture in the all-glass still and distill over approximately 200 ml.

(3) Halt the distillation and add 50 ml. of warm distilled water to the distilling flask.

(4) Resume distillation and continue until a total of 250 ml. has been distilled over.

(5) Acidify the distillate with 1 ml. of 10% H_3PO_4, add 5 ml. of $CuSO_4$ and transfer to a separatory funnel.

(6) Add 75 gms. of fine-grained NaCl to the soln. in the funnel and shake until all the salt is dissolved.

(7) Make 3 serial extractions, using 50 ml. of chlorofform each time, collect all chloroform extracts into the same flask and discard the water layer after the third extractions.

(8) Extract the chloroform twice with 75 ml. portions of 0.1 N NaOH and combine the alkaline extracts.

Discard the chloroform layer.

(9) Dilute the NaOH extract back to the original volume, using a volumetric flask.

D. Estimation of Phenol

(1) Use Gibbs procedure as given in "Standard Methods for the Examination of Water and Sewage."

Sample Point #1

Bowie River 1/8 Mile Above Hercules Stump Washer Effluent

River Mile - Bowie 2.4

Bowie-Leaf River Survey Data Summary Sheet

United States Public Health Center

Lab. No.	Date 1951	Discharge		T °C	Dissolved Oxygen		B.O.D. At 20°C 5-Day		pH	Total Alk.	Phenols		Oxygen Consumed	TOTAL SOLIDS						SUSPENDED SOLIDS					
														Total		Volatile		Fixed		Total		Volatile		Fixed	
		cfs	MGD		ppm	%SAT.	ppm	Lbs/day		ppm	ppb	Lbs/day	ppm	ppm	Lbs/day	ppm	Lbs/day	ppm	Lbs/day	ppm	Lbs/day	ppm	Lbs/day	ppm	Lbs/day
210	3/26	800	517	16	9.8	98	0.6	2590	6.3	9.1	-	-	13.5	94	405000	28	121000	66	284000	28	121000	13	56000	15	65000
261	4/9	1180	762	17	8.7	89	0.2	8540	6.7	11.0	15	96	12.7	53	337000	15	95000	38	242000	22	140000	8	51000	14	89000
281	4/10	1050	678	16	8.7	87	0.2	1130	6.6	9.1	5	29	15.6	55	311000	14	79000	41	232000	16	91000	6	34000	10	57000
301	4/11	980	633	17	8.8	90	0.3	1580	6.6	8.2	-	-	9.7	-	-	-	-	-	-	-	-	-	-	-	-
321	4/12	1000	646	15	9.1	90	0.4	2160	6.7	7.6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
342	4/13	970	627	15	9.0	89	0.2	1050	6.9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
363	4/14	870	562	17	9.2	94	0.3	1410	7.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
384	4/15	790	510	18	9.2	96	0.4	1700	7.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	—	-
Average (All Samples)		955	617	16	9.1	92	0.4	1770	6.8	9.0	10	62	12.9	67	351000	19	98000	48	253000	22	117000	9	47000	13	70000

Sample Point #2

Hercules Stump Water Affluent, At Bowie River

River Mile - Bowie 0.85

Bowie-Leaf River Survey — Data Summary Sheet

United States Public Health Service

Lab. No.	Date 1951	Discharge cfs	Discharge MGD	T. °C	Dissolved Oxygen ppm	Dissolved Oxygen %SAT.	B.O.D. AT 20°C 5-DAY ppm	B.O.D. AT 20°C 5-DAY Lbs/day	pH	Total Alk. ppm	Oxygen Consumed ppm	TOTAL SOLIDS Total ppm	TOTAL SOLIDS Total Lbs/day	TOTAL SOLIDS Volatile ppm	TOTAL SOLIDS Volatile Lbs/day	TOTAL SOLIDS Fixed ppm	TOTAL SOLIDS Fixed Lbs/day	SUSPENDED SOLIDS Total ppm	SUSPENDED SOLIDS Total Lbs/day	SUSPENDED SOLIDS Volatile ppm	SUSPENDED SOLIDS Volatile Lbs/day	SUSPENDED SOLIDS Fixed ppm	SUSPENDED SOLIDS Fixed Lbs/day
128	3/12	0.008	0.432	22	3.8	43	44	158	6.4	19.0	450	1178	4240	350	1260	828	2980	966	3410	280	1000	686	2410
143	3/14	0.008	0.432	13	7.1	67	56	202	5.8	6.2	360	698	2510	264	950	432	1560	484	1740	204	740	280	1000
152	3/15	0.008	0.432	16	6.1	61	80	288	5.9	10.0	360	868	3120	292	1050	574	2070	616	2220	240	860	376	1360
161	3/16	0.008	0.432	16	5.6	56	75	270	5.8	9.3	470	1160	4180	366	1320	794	2860	856	3070	296	1070	560	2010
211	3/20	0.008	0.432	22	3.9	44	64	231	5.3	6.8	-	1174	4230	450	1630	722	2600	938	3380	310	1120	628	2260
283	4/9	0.008	0.432	21	2.6	29	57	205	5.7	-	-	1313	4800	452	1630	861	3170	996	3590	352	1270	644	2320
283	4/10	0.008	0.432	26	2.4	29	80	288	4.9	-	-	2195	7860	714	2570	1411	5090	1732	6240	524	1890	1208	4350
303	4/11	0.008	0.432	24	2.6	30	81	291	5.4	-	-	-	-	-		-		-		-		-	
323	4/12	0.008	0.432	17	0.5	05	-	-	6.4	-	-	-		-		-		-		-		-	
344	4/13	0.008	0.432	23	1.1	13	143	515	5.1	-	-	-		-		-		-		-		-	
365	4/14	0.008	0.432	27	2.0	25	84	302	5.4	-	-	-		-		-		-		-		-	
386	4/15	0.008	0.432	29	0.2	3	142	512	4.7	-	-	-		-		-		-		-		-	
Average (First Four)		0.008	0.432	17	5.7	57	64	230	5.9	11.1	410	975	3510	318	1140	657	2370	726	2610	255	920	471	1690
Average (Last Eight)		0.008	0.432	24	2.7	29	93	335	5.4	-	-	1540	5560	540	1940	1000	3620	1222	4400	394	1420	827	2970
Average (All Samples)		0.008	0.432	21	3.7	39	82	297	5.6	10.7	410	1208	4350	414	1490	806	2900	940	3380	315	1140	625	2240

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Bowie-Leaf River Survey-Data Summary Sheet

United States Public Health Service

Sample Point #3
Bowie River At Railroad Bridge
1/6 Mile Below Hercules Stump Washer Effluent

River Mile - Bowie 2.1

Lab No.	Date 1951	Discharge cfs	Discharge MGD	T. °C.	Dissolved Oxygen ppm	Dissolved Oxygen Lbs/day	B.O.D. at 20°C 5-DAY ppm	B.O.D. at 20°C 5-DAY Lbs/day	pH	Total Alk. ppm	Oxygen Consumed ppm	TOTAL SOLIDS Total ppm	TOTAL SOLIDS Total Lbs/day	TOTAL SOLIDS Volatile ppm	TOTAL SOLIDS Volatile Lbs/day	TOTAL SOLIDS Fixed ppm	TOTAL SOLIDS Fixed Lbs/day	SUSPENDED SOLIDS Total ppm	SUSPENDED SOLIDS Total Lbs/day	SUSPENDED SOLIDS Volatile ppm	SUSPENDED SOLIDS Volatile Lbs/day	SUSPENDED SOLIDS Fixed ppm	SUSPENDED SOLIDS Fixed Lbs/day
129	3/12	730	472	19	8.9	91	0.7	2600	6.8	13.0	8.2	54	210600	19	74800	35	137800	19	74800	6	23600	13	51200
144	3/14	760	492	11	10.0	91	0.7	3000	6.6	11.0	13.0	82	336000	31	127000	51	209000	11	45100	1	4100	10	41000
153	3/15	690	446	12	10.1	93	0.8	3050	6.8	13.0	15.1	71	264100	21	78100	50	186000	11	40900	6	22300	5	18600
162	3/16	630	407	12	10.0	93	0.9	3090	6.5	10.0	13.9	90	305500	25	84900	65	220600	14	47500	9	30500	5	17000
212	3/26	800	517	16	9.6	97	0.8	3280	6.1	8.9	10.2	79	341000	37	159000	42	181000	18	77600	11	47400	7	30200
284	4/9	1180	762	17	8.7	90	0.4	2730	6.6	-	-	-		-		-		-		-		-	
284	4/10	1050	678	17	9.0	94	0.5	2660	6.4	-	-	-		-		-		-		-		-	
304	4/11	980	633	17	9.0	90	0.4	3590	6.5	-	-	-		-		-		-		-		-	
324	4/12	1000	646	16	9.4	94	0.8	5710	6.6	-	-	-		-		-		-		-		-	
345	4/13	970	627	15	9.2	91	0.5	2610	6.7	-	-	-		-		-		-		-		-	
366	4/14	870	510	16	9.0	93	0.4	1920	7.0	-	-	-		-		-		-		-		-	
387	4/15	790	510	18	9.0	95	0.4	1570	7.0														
Average (First Four)		703	454	14	9.8	92	0.7	2940	6.7	11.8	12.6	74	279600	24	91200	50	188400	14	52100	6	20100	8	32000
Average (Last Eight)		359	217	17	9.1	93	0.6	3010	6.6	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Average (All Samples)		871	563	16	9.3	93	0.6	2990	6.6	11.2	12.1	75	291800	27	108400	27	187000	15	57200	7	25600	8	31600

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Sample Point #-

Bowie River 250 Feet Above Hercules Main Plant Effluent

River Mile - Bowie 1.4

Bowie-Leaf River Survey - Date Summary Sheet

United States Public Health Service

Lab. No.	Date 1951	Discharge		T. °C.	Dissolved Oxygen		B.O.D. At 20°C, 5-DAY		pH	Phenols		TOTAL SOLIDS						SUSPENDED SOLIDS					
												Total		Volatile		Fixed		Total		Volatile		Fixed	
		cfs	MGD		ppm	%SAT.	ppm	Lbs/day		ppb	Lbs/day	ppm	Lbs/day	ppm	Lbs/day	ppm	Lbs/day	ppm	Lbs/day	ppm	Lbs/day	ppm	Lbs/day
285	4/9	1180	762	18	8.7	91	0.6	3560	6.7	10	64	64	406700	19	120700	45	286000	21	133400	3	19000	18	114400
285	4/10	1050	678	17	8.6	88	0.3	1410	6.8	5	28	67	378900	29	164000	38	214900	16	90500	1	5700	15	84800
305	4/11	980	633	17	8.8	90	0.5	2800	6.7	-	-	56	295700	12	63400	44	232300	12	63400	1	5300	11	58100
325	4/12	1000	646	15	9.0	89	0.4	2420	-	5	27	-	-	-	-	-	-	-	-	-	-	-	-
340	4/13	970	627	15	9.2	90	0.4	2040	6.9	-	-	-	-	-	-	-	-	-	-	-	-	-	-
367	4/14	870	562	16	9.2	92	0.6	2580	7.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
388	4/15	790	510	19	9.0	97	0.6	2420	7.0	-	-	-	-	-	-	-	-	-	--	-	-	-	-
Average (All Samples)		977	631	17	8.9	91	0.5	2460	6.9	7	40	62	360400	30	116000	32	244400	16	95800	2	10000	14	85800

Sample Point #5

Hercules Main Effluent At Plant

Bowl-Leaf River Survey - Data Summary Sheet

United States Public Health Service

Lab. No.	Date 1954	Discharge cfs	Discharge MGD	T. °C.	Dissolved Oxygen ppm	Dissolved Oxygen lbs/day	B.O.D. At 20°C 5-DAY ppm	B.O.D. At 20°C 5-DAY lbs/day	pH	Total Alk. ppm	Total Acidity ppm	Oxygen Consumed ppm	Total Solids Total ppm	Total Solids Total lbs/day	Total Solids Volatile ppm	Total Solids Volatile lbs/day	Total Solids Fixed ppm	Total Solids Fixed lbs/day	Suspended Solids Total ppm	Suspended Solids Total lbs/day	Suspended Solids Volatile ppm	Suspended Solids Volatile lbs/day	Suspended Solids Fixed ppm	Suspended Solids Fixed lbs/day
135	3/12	7.00	4.90	28	0	0	[illegible]	9,000	6.4	27	-	341	316	12910	117	4780	199	8130	117	4940	28	1140	83	3400
145	3/14	7.00	4.90	26	0	0	265	11,200	4.3	-	-	327	2[illegible]	12380	[illegible]	2700	1[illegible]	7580	112	4820	28	1140	90	3080
154	3/15	7.00	4.90	26	0	0	318	13,000	6.9	34	-	-	2[illegible]	11410	63	2570	180	8540	84	2010	35	1470	79	1180
163	3/16	7.00	4.90	28	0	0	355	14,500	7.3	57	-	-	31[illegible]	12870	112	4560	203	8290	14[illegible]	1800	59	2400	83	3400
Av rage (Omit 3/12 data)		7.00	4.90	27	0	0	313	12,900	6.2	39	35	334	277	11320	98	3800	187	7610	109	4440	36	1530	71	2910

Sample Point No

Fertilizer Plant, Food effluent

Sample No.	Date 1950	Discharge cfs	Discharge mgd	T. °C.	Dissolved Oxygen ppm	Dissolved Oxygen % SAT.	B.O.D. at 20°C. ppm	B.O.D. at 20°C. Lbs/day	pH	Acidity Total ppm	Acidity Mineral ppm	Oxygen Consumed ppm	TOTAL SOLIDS Total ppm	TOTAL SOLIDS Total Lbs/day	TOTAL SOLIDS Volatile ppm	TOTAL SOLIDS Volatile Lbs/day	TOTAL SOLIDS Fixed ppm	TOTAL SOLIDS Fixed Lbs/day	SUSPENDED SOLIDS Total ppm	SUSPENDED SOLIDS Total Lbs/day	SUSPENDED SOLIDS Volatile ppm	SUSPENDED SOLIDS Volatile Lbs/day	SUSPENDED SOLIDS Fixed ppm	SUSPENDED SOLIDS Fixed Lbs/day
130	3/12	0.0185	0.[illegible]	13	7.3	87	[illegible]	0.4	[illegible]	384	283	63.0	748	25	211	7	545	18.0	291	10.0	43	1.0	248	9.0
140	3/14	0.0185	0.[illegible]	3	12.1	90	[illegible]	0.1	3.3	101	56	72.5	203	7	47	2	156	5.0	20	0.6	4	0.1	16	0.5
150	3/15	0.0185	0.00[illegible]	6	11.7	9[illegible]	[illegible]	[illegible]	[illegible]	52	30	-	-		-		-		-		-		-	
164	3/1[illegible]	0.0185	0.00[illegible]	7	11.2	93	[illegible]	0.1	[illegible]	48	17	-	-		-		-		-		-		-	
Average (Al. Samples)		0.0185	0.0[illegible]	7	11.1	93	[illegible]	0.2	[illegible]	[illegible]	230	3[illegible]	460	16	130	4	340	12	155	5.3	23	0.5	132	4.8

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Lab. No.	Date 1951	Discharge cfs	Discharge MGD	T. °C.	Dissolved Oxygen ppm	Dissolved Oxygen %sat.	B.O.D. at 20°C. 5-DAY ppm	B.O.D. at 20°C. 5-DAY lbs/day	pH	Alkalinity Total ppm	Alkalinity Phenol Phthalein ppm	Oxygen Consumed ppm	Phenols ppb	Phenols lbs/day	TOTAL SOLIDS Total ppm	TOTAL SOLIDS Total lbs/day	TOTAL SOLIDS Volatile ppm	TOTAL SOLIDS Volatile lbs/day	TOTAL SOLIDS Fixed ppm	TOTAL SOLIDS Fixed lbs/day	SUSPENDED SOLIDS Total ppm	SUSPENDED SOLIDS Total lbs/day	SUSPENDED SOLIDS Volatile ppm	SUSPENDED SOLIDS Volatile lbs/day	SUSPENDED SOLIDS Fixed ppm	SUSPENDED SOLIDS Fixed lbs/day
134	3/12	7.[illegible]	4.90	26	1.3	16	337	13300	5.4	6.8		483	-	-	447	14160	119	4680	234	9600	177	7230	38	1550	139	5640
147	3/14	7.60	4.90	30	2.1	23	310	12600	6.1	15.0	-	337	-	-	311	12710	90	3680	221	9030	155	6330	48	1960	107	4370
170	3/15	7.60	4.90	23	2.5	29	260	10600	6.3	67.0		368	-	-	227	9270	60	2450	167	6820	53	2170	23	940	30	1230
185	3/16	7.60	4.90	24	3.4	40	307	12500	6.5	67.0		408	-	-	250	10200	68	2800	182	7400	99	4040	40	1630	59	2410
49	3/26	7.60	4.90	29	2.5	32	442	18000	7.2	10.0	-	401	-	-	484	19760	216	8830	268	10950	223	9070	126	5150	96	3920
87	4/2	7.60	4.90	27	1.5	20	247	10100	4.1	-	-	-	500	20	333	13600	106	4330	233	9520	94	3840	32	1310	62	2530
206	4/10	7.90	4.90	32	0.8	11	506	20700	3.0	-	-	-	250	10	-	-	-	-	-	-	-	-	-	-	-	-
306	4/..	7.60	4.90	29	0.3	4	381	15600	6.3	-	-	-	-	-	418	17090	170	6950	258	10540	164	6700	90	3680	74	3070
320	4/11	7.60	4.90	27	0.4	5	568	23200	4.0	-	-	-	125	5	-		-		-		-	-	-		-	
347	4/12	7.60	4.90	30	-	-	352	14400	3.7	-	-	-	-	-	-		-		-		-	-	-		-	
365	4/14	7.90	4.90	30	1.3	17	271	11100	6.7	-	-	-	-	-	-		-		-		-	-	-		-	
3[illegible]	4/15	7.60	4.90	31	1.9	25	[illegible]	4900	3.8	-	-	-	-	-	-		-		-		-	-	-		-	
Average (First Four)		7.60	4.90	24	2.3	27	304	12400	7.1	40.0	4.8	414	-	-	284	11600	88	3580	196	8020	121	4940	37	1520	84	3420
Average (Last Eight)		7.60	4.90	30	1.2	16	400	16300	5.7	-	-	-	290	12	417	17030	164	6700	253	10350	160	6530	83	3380	77	3150
Average (All Samples)		7.60	4.90	28	1.6	20	367	15000	6.7	44.4	4.8	451	290	12	341	13930	120	4920	221	9010	138	5640	57	2320	81	3320

Sample Point #8
Bowie River 3/8 Mile Below Hercules Main Plant Effluent
River Mile - Bowie 0.9

Lab. No.	Date 1951	Discharge		T. °C.	Dissolved Oxygen		B.O.D. AT 20°C. 5-DAY		pH
		C/S	MGD		ppm	%SAT.	ppm	Lbs/day	
267	4/9	1190	769	18	8.5	89	3.8	24000	6.5
287	4/10	1060	685	17	8.4	86	5.4	31100	6.8
307	4/11	990	640	18	8.5	89	2.1	11000	6.6
327	4/12	1010	653	15	8.8	87	3.4	18400	6.5
348	4/13	980	633	16	8.8	89	4.3	22900	6.9
369	4/14	880	569	17	8.4	86	7.3	34600	6.8
390	4/15	800	517	19	8.6	92	3.5	15100	6.9
Average (All Samples)		990	652	17	8.6	88	4.3	22400	6.7

Sample Point #9
Bowie River 3/4 Mile Below Hercules Main Plant Effluent
River Mile - Bowie 0.6

Lab. No.	Date 1951	Discharge		T. °C	Dissolved Oxygen		B.O.D. AT 20°C. 5-DAY		pH	Phenols	
		cfs	MGD		ppm	%SAT	ppm	Lbs/day		ppb	Lbs/day
268	4/9	1190	769	18	8.5	89	3.0	19200	6.5	20	128
288	4/10	1060	685	17	8.3	85	5.7	32500	6.5	5	29
308	4/11	990	640	18	8.4	89	2.4	12900	6.8	-	-
328	4/12	1010	653	16	8.7	88	3.3	18100	6.5	7	38
349	4/13	980	633	16	8.8	88	3.1	16300	6.9	-	-
370	4/14	880	569	17	8.5	87	4.7	22300	7.0	-	-
391	4/15	800	517	19	8.3	88	3.7	16000	6.9	-	-
Average (All Samples)		990	652	17	8.5	88	3.7	19600	6.7	11	65

Sampling Point #.1

Sauk River 1/2 Mile Above Confluence with Skagit River

River Mile Sauk 9.12

Skagit-Sauk River Supply Data Summary Sheet
United States Public Health Service

Lab. No.	Date 1954	Discharge cfs	Discharge MGD	T. °C.	Dissolved Oxygen ppm	Dissolved Oxygen %Sat.	... AT ...°C, 5-DAY ppm	... AT ...°C, 5-DAY Lbs/day	pH	Total Alk. ppm	Phenols ppb	Phenols Lbs/day	Oxygen Consumed ppm	Total Solids ppm	Total Solids Lbs/day	Volatile ppm	Volatile Lbs/day	Fixed ppm	Fixed Lbs/day	Suspended Solids Total ppm	Suspended Solids Total Lbs/day	Suspended Solids Volatile ppm	Suspended Solids Volatile Lbs/day	Suspended Solids Fixed ppm	Suspended Solids Fixed Lbs/day
136	3/22	740	478	17	8.5	87	4.1	16300	6.6	11.0	-	-	19.2	79	315000	39	155000	40	160000	18	72000	14	56000	4	16000
146	3/24	770	498	12	9.7	90	5.0	20800	6.2	10.0	-	-	20.1	90	374000	30	125000	60	249000	26	108000	9	37000	17	71000
157	3/25	700	452	11	9.7	88	3.2	13100	7.1	7.2	-	-	22.6	75	283000	20	76000	55	207000	11	41000	14	15000	7	26000
168	3/26	640	414	12	9.7	88	3.4	14400	6.8	12.0	-	-	18.1	92	317000	25	86000	67	231000	14	48000	8	27000	6	21000
210	3/26	810	523	15	9.0	89	2.5	11100	6.7	12.0	-	-	17.3	76	331000	29	126000	47	206000	22	96000	8	35000	14	61000
237	4/9	1,490	769	18	8.4	88	.4	1500	6.6	-	15	56	-	48	308000	9	58000	33	250000	24	154000	8	51000	16	103000
248	4/10	1080	665	17	8.3	85	3.8	21300	6.6	-	5	29	-	51	291000	22	126000	29	165000	22	126000	3	17000	13	74000
309	4/11	930	640	18	8.3	87	2.4	12500	6.6	-	-	-	--	50	266000	25	133000	25	133000	19	102000	5	27000	14	75000
339	4/12	1040	653	16	8.6	87	3.5	19100	6.6	-	10	54	-	-	-	-	-	-	-	-	-	-	-	-	-
350	4/13	960	631	13	8.6	85	3.1	15900	6.9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
371	4/14	660	569	10	8.6	86	4.9	13300	6.9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
390	4/15	800	547	13	8.0	86	4.8	20700	6.9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Average (First Five)		710	490	13	9.4	86	3.9	15900	6.7	10.0	-	-	20.0	84	320000	28	110000	56	212000	17	670000	9	34000	8	33000
Average (Last Eight)		965	624	17	8.5	87	3.1	17500	6.7	-	10	60	-	66	299000	21	111000	35	188000	22	120000	8	42000	14	78000
Average (All Samples)		860	569	16	8.8	87	3.6	17000	6.7	10.4	10	60	19.5	70	311000	25	111000	45	200000	20	93000	8	37000	12	56000

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Sample Point #11

Leaf River 1/4 Mile Above Confluence with Bowie River

River Mile - Leaf 09.2

United States Public Health Service

Lab. No.	Date 1951	Discharge		T. °C.	Dissolved Oxygen		B.O.D. At 20°C. 5-DAY		pH	Total Alk.	Phenols		Oxygen Consumed	TOTAL SOLIDS						SUSPENDED SOLIDS					
														Total			Volatile		Fixed	Total		Volatile		Fixed	
		cfs	MGD		ppm	%SAT.	ppm	Lbs/day		ppm	ppb	Lbs/day	ppm	pH	ppm	ppm	Lbs/day	ppm	Lbs/day	ppm	Lbs/day	ppm	Lbs/day	ppm	Lbs/day
133	3/12	530	342	17	8.9	92	0.7	2390	7.0	19.0	-	-	15.2	-	-	-	-	-	-	-	-	-	-	-	-
149	3/14	800	517	12	10.0	93	1.4	5850	6.9	19.0	-	-	12.9	-	-	-	-	-	-	-	-	-	-	-	-
158	3/15	680	443	11	10.2	92	1.4	5180	7.1	16.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
167	3/16	610	394	12	10.2	94	1.3	4280	7.0	19.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
217	3/26	2060	1330	14	9.4	91	1.5	15300	6.8	15.0	-	-	-	91	976000	-11	116000	80	856000	-	590000	7	75000	48	515000
270	4/9	1990	1286	17	8.6	90	0.5	5560	7.0	-	-	-	-	133	1820000	19	265000	114	1615000	74	1012000	8	109000	66	903000
290	4/10	2540	1642	17	8.8	88	0.6	7350	6.8	-	-	-	-	124	1711000	15	952000	55	759000	74	566000	6	883000	35	483000
310	4/11	2560	1655	17	8.4	90	0.7	8830	6.9	-	-	-	-	-	-	69	-	-	-	-	-	-	-	-	-
330	4/12	2090	1350	15	9.9	88	0.8	9490	6.7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
351	4/13	1820	1176	15	9.1	90	0.8	8830	6.7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
372	4/14	1550	1002	16	9.1	91	0.6	5430	6.7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
393	4/15	1400	905	18	8.9	94	0.6	4150	7.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Average (First Four)		870	434	13	9.8	93	1.2	4410	7.0	16.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Average (Last Eight)		2000	1290	16	9.0	90	0.7	7700	6.9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Average (All Samples)		1360	1000	15	9.2	91	0.9	6600	6.9	[illegible]	-	-	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

Sample Point #12
Leaf River At Mississippi Central Railroad Bridge,
River Mile - Leaf 68.5

Lab. No.	Date 1951	Discharge		T. °C	Dissolved Oxygen		B.O.D. At 20°C. 5-DAY		pH	Total Alk.	Oxygen Consumed
		cfs	MGD		ppm	%SAT.	ppm	Lbs/day		ppm	ppm
134	3/12	1330	860	16	8.6	87	2.4	17400	6.8	13.0	15.9
150	3/14	1570	1015	12	9.8	90	2.7	22600	6.9	15.0	15.0
159	3/15	1380	890	10	9.8	87	2.0	14600	7.1	16.0	-
168	3/16	1250	805	11	10.0	90	1.8	12100	7.0	17.0	-
218	3/26	2870	1850	15	9.3	91	1.7	26200	6.6	-	17.7
271	3/27	3180	2060	17	8.6	88	1.0	17200	6.0		-
291	4/10	3600	3330	17	8.6	90	1.8	35000	6.7	-	-
311	4/11	3550	2300	18	8.6	90	1.5	28800	6.7	-	-
331	4/12	3100	2000	15	8.8	86	1.5	25000	6.7	-	-
352	4/13	2800	1810	15	8.9	88	1.5	22600	6.7	-	-
373	4/14	2430	1570	16	8.8	89	2.5	32700	6.7	-	-
394	4/15	2200	1420	18	8.5	89	1.9	22500	7.1	-	-
Average (First Four)		1380	890	12	9.5	88	2.2	16700	7.0	15.0	-
Average (Last Eight)		2970	1920	16	8.8	89	1.7	26300	6.6	-	-
Average (All Samples)		2440	1580	15	9.0	89	1.9	23000	6.8	15.0	16.2

Sample Point #13
Leaf River At River Avenue Bridge
River Mile - Leaf 67.4

Lab. No.	Date 1951	Discharge		T. °C.	Dissolved Oxygen		B.O.D. AT 20°C. 5-DAY		pH
		cfs.	MGD		ppm	%SAT.	ppm	Lbs/day	
272	4/9	3180	2060	18	8.7	91	1.0	17200	6.9
292	4/10	3600	2330	17	8.5	88	1.5	29000	6.7
312	4/11	3550	2300	17	8.7	89	1.5	28800	6.7
332	4/12	3100	2000	15	8.8	87	1.4	23400	6.7
353	4/13	2800	1810	15	8.9	89	1.3	19600	6.7
374	4/14	2430	1570	16	8.7	88	2.2	28800	6.7
395	4/15	2200	1420	19	8.5	91	2.2	26000	6.6
Average (All Samples)		2980	1930	17	8.7	89	1.6	24700	6.7

Sample Point #14
Leaf River
2 Miles Below
Hattiesburg, Sewer
Outfall

River Mile - Leaf 65.6

Lab. No.	Date 1951	Discharge		T. °C.	Dissolved Oxygen		B.O.D. At 20°C, 5-day		pH
		cfs	MGD		ppm	%SAT.	ppm	Lbs/day	
273	4/9	3180	2060	18	8.5	89	1.4	24000	6.7
293	4/10	3600	2330	17	8.6	88	1.9	36900	6.8
313	4/11	3550	2300	17	8.4	87	1.4	26800	6.6
333	4/12	3100	2000	15	8.7	86	1.6	26700	6.7
354	4/13	2800	1810	15	8.7	86	1.5	22600	6.6
375	4/14	2430	1570	17	8.6	88	2.4	31400	6.6
396	4/15	2200	1420	19	8.4	90	1.5	17800	6.5
Average (All Samples)		2980	1930	17	8.6	88	1.7	26600	6.6

Sample Point #15
Leaf River 2 Miles Below Turpentine Creek
River Mile - Leaf = 61,8

Lab. No.	Date 1951	Discharge		T. °C.	Dissolved Oxygen		B.O.D. At 20° 5-DAY		pH
		cfs	MGD		ppm	%SAT.	ppm	Lbs/day	
274	4/9	3180	2060	19	8.5	91	1.1	18900	6.7
294	4/10	3600	2330	18	8.4	88	1.6	31100	6.7
314	4/11	3550	2300	17	8.4	86	1.4	26800	6.7
334	4/12	3100	2000	16	8.6	87	1.5	25000	6.7
355	4/13	2800	1810	16	8.7	88	1.0	15100	6.7
376	4/14	2430	1570	17	8.3	85	2.5	32700	6.8
397	4/15	2200	1420	19	8.1	86	1.2	14200	6.8
Average (All Samples)		2980	1930	17	8.4	87	1.5	23400	6.7

Sample Point #16

Leaf River AT MCCallum, Mississippi Highway Bridge

River Mile - Leaf 56.5

Lab. No.	Date 1951	Discharge		T. °C.	Dissolved Oxygen		B.O.D. AT 20°C 5-DAY		pH
		cfs	MGD		ppm	% SAT.	ppm	Lbs/day	
275	4/9	3180	2060	18	8.4	89	1.0	17200	6.7
295	4/10	3600	2330	17	8.6	88	1.2	23300	6.6
315	4/11	3550	2300	18	8.4	89	1.0	19200	6.5
336	4/12	3100	2000	16	8.7	88	1.2	20000	6.6
357	4/13	2800	1810	16	8.4	89	1.2	18100	6.7
378	4/14	2430	1570	18	8.4	88	1.5	19600	6.6
399	4/15	2200	1420	19	8.1	87	0.9	10700	6.8
Average (Samples)		2980	1930	17	8.6	88	1.1	18300	6.6

Sample Point #17

Leaf River AT Mahned, Mississippi Highway Bridge

River Mile - Leaf 47.1

Lab. No.	Date 1951	Discharge		T. °C.	Dissolved Oxygen		B.O.D. AT 20° 5-DAY		pH	TOTAL SOLIDS						SUSPENDED SOLIDS					
										Total		Volatile		Fixed		Total		Volatile		Fixed	
		cfs	MGD		ppm	%SAT.	ppm	Lbs/day		ppm	Lbs/day	ppm	Lbs/day	ppm	Lbs/day	ppm	Lbs/day	ppm	Lbs/day	ppm	Lbs/day
276	4/9	3180	2060	18	8.4	88	0.6	10300	6.7	-	-	-	-	-	-	-	-	-	-	-	-
296	4/10	3600	2330	17	8.4	86	1.2	23300	6.7	-	-	-	-	-	-	-	-	-	-	-	-
316	4/11	3550	2300	16	8.2	87	1.1	21100	6.5	-	-	-	-	-	-	-	-	-	-	-	-
337	4/12	3100	2000	16	8.4	85	1.4	23400	6.6	-	-	-	-	-	-	-	-	-	-	-	-
358	4/13	2800	1810	16	8.3	83	1.4	21100	6.6	78	1177000	26	392000	52	785000	35	528000	3	45000	32	483000
379	4/14	2430	1570	18	8.4	88	1.3	17000	6.6	64	838000	25	327000	39	511000	33	432000	3	39000	30	393000
400	4/15	2200	1420	19	8.0	86	1.0	11800	6.7	56	663000	4	47000	52	616000	24	284000	2	24000	22	260000
Average (All Samples)		2980	1930	17	8.3	86	1.1	18300	6.6	66	893000	18	255000	48	638000	31	415000	3	36000	28	379000

Sample Point #15

Tallahala Creek At Leaf River

Lab. No.	Date 1951	Discharge		T. °C.	Dissolved Oxygen		B.O.D. AT20° C. 5-DAY		pH
		cfs	MGD		ppm	%SAT.	ppm	Lbs/day	
335	4/12	1790	1160	15	7.4	73	45	435000	6.6
356	4/13	1540	995	16	5.8	59	41	340000	6.3
377	4/14	1330	860	19	5.0	54	49	351000	6.6
398	4/15	1260	815	19	4.2	45	54	367000	6.4
Average (All Samples)		1480	960	17	5.6	58	47	373000	6.5

Sample Point #13

Leaf River At New Augusta, Mississippi Highway Bridge

River Mile - Leaf 42.2

Lab. No.	Date 1951	Discharge		T. °C.	Dissolved Oxygen		B.O.D. AT 20°C 5-DAY		pH	TOTAL SOLIDS						SUSPENDED SOLIDS					
										Total		Volatile		Fixed		Total		Volatile		Fixed	
		cfs	MGD		ppm	% SAT.	ppm	Lbs/day		ppm	Lbs/day	ppm	Lbs/day	ppm	Lbs/day	ppm	Lbs/day	ppm	Lbs/day	ppm	Lbs/day
277	4/9	4710	3046	18	7.1	78	4.7	121000	6.4	-	-	-	-	-	-	-	-	-	-	-	-
297	4/10	3110	3420	17	7.8	78	5.6	160000	6.4	-	-	-	-	-	-	-	-	-	-	-	-
317	4/11	3710	3420	16	7.1	74	4.1	113000	6.4	-	-	-	-	-	-	-	-	-	-	-	-
338	4/12	4430	2860	16	7.4	74	5.5	131000	6.2	-	-	-	-	-	-	-	-	-	-	-	-
359	4/13	4740	2800	14	7.4	78	5.0	117000	6.7	105	2520000	73	1705000	32	1214000	18	430000	17	399000	1	31000
380	4/14	3780	3430	17	7.1	73	5.2	149000	6.8	69	1974000	34	983000	35	1441000	41	1174000	15	430000	26	744000
401	4/15	3440	2240	19	6.6	70	5.2	97000	6.8	66	1234000	39	731000	58	1083000	14	262000	5	93000	13	169000
Average (Mon. thru Sat.)		4140	2940	17	7.0	74	5.1	125000	6.8	101	2473000	47	923000	54	1550000	40	972000	12	292000	28	680000

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Sample Point #20
Leaf River at Wingate Mississippi Highway Bridge
River Mile - Leaf 37.3

Lab. No.	Date 1951	Discharge		T. °C.	Dissolved		B.O.D. At 20°C. 5- DAY		pH
		cfs	MGD		ppm	%SAT.	ppm	Lbs/day	
278	4/9	5920	3830	18	7.1	75	4.2	134000	6.4
298	4/10	5920	3830	17	7.3	75	4.6	147000	6.5
318	4/11	5600	3620	18	6.9	72	4.5	136000	6.5
339	4/12	4460	2880	16	7.4	75	5.0	120000	6.5
360	4/13	4280	2770	17	7.7	79	4.6	106000	6.5
381	4/14	4370	2820	18	7.0	74	4.8	113000	6.5
402	4/15	3960	2560	19	6.4	69	-	-	6.7
Average (All Samples)		4930	3190	18	7.1	74	4.6	126000	6.5

Sample Point #21 Leaf River At Beaumont, Mississippi Highway
River Mile = Leaf 29.2

Lab. No.	Date 1951	Discharge		T. °C.	Dissolved Oxygen		B.O.D. At 20°C. 5-day		pH
		cfs	MGD		ppm	%SAT.	ppm	Lbs/day	
279	4/9	5920	3830	18	6.2	66	4.2	134000	6.3
299	4/10	5920	3830	17	7.4	75	4.3	137000	6.4
319	44/11	5600	3620	18	7.1	75	3.8	115000	6.4
340	4/12	4460	2880	16	7.3	73	4.3	103000	6.5
361	4/13	4280	2770	17	7.3	75	4.1	95000	6.5
382	4/14	4370	2820	18	7.1	74	4.0	94000	6.5
403	4/15	3960	2560	19	6.4	68	4.0	85000	6.6
Average (All Samples)		4930	3190	18	7.0	72	4.1	109000	6.5

Sample Point #22
Leaf River at McLain, Mississippi Highway #15 Bridge
River Mile - Leaf 14.7

Bowie-Leaf River Survey Data Summary Sheet
United States Public Health Service

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Lab. No.	Date 1951	Discharge		T °C	Dissolved Oxygen		B.O.D. At 20°C 5-DAY		pH	TOTAL SOLIDS						SUSPENDED SOLIDS					
										Total		Volatile		Fixed		Total		Volatile		Fixed	
		cfs	MGD		ppm	%SAT.	ppm	Lbs/day		ppm	Lbs/day	ppm	Lbs/day	ppm	Lbs/day	ppm	Lbs/day	ppm	Lbs/day	ppm	Lbs/day
280	4/9	8540	5520	19	6.0	64	3.4	157000	6.2	-	-	-	-	-	-	-	-	-	-	-	-
300	4/10	7750	5010	17	6.9	71	3.3	138000	6.1	-	-	-	-	-	-	-	-	-	-	-	-
320	4/11	7100	4590	18	6.9	72	3.5	125000	6.5	-	-	-	-	-	-	-	-	-	-	-	-
341	4/12	6590	4260	18	7.1	72	3.4	121000	6.4	-	-	-	-	-	-	-	-	-	-	-	-
362	4/13	6010	3880	16	7.2	72	3.6	116000	6.4	102	3300000	33	1069000	69	2238000	40	1294000	3	97000	37	119700
383	4/14	5400	3490	17	6.9	71	3.3	96000	6.5	100	2911000	36	1048000	64	1863000	38	1106000	7	204000	31	902000
404	4/15	4780	3090	19	6.7	72	3.4	87000	6.2	92	2348000	21	536000	71	1812000	30	766000	2	51000	28	715000
Average (All Samples)		6590	4260	17	6.8	71	3.4	120000	6.3	8	2853000	30	884000	68	1969000	36	1055000	4	117000	32	938000

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